An Investigation of the Social and Economic Factors Affecting the Development of Small-Scale Forestry By Rural Households in Leyte Province, Philippines:

A Typology of Rural Households in Relation to Small-Scale Forestry

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Candidate's Statement of Originality

The work contained in this thesis is solely that of the author, Nicholas F. Emtage.

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Publications by the Candidate Relevant to this Thesis

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ABSTRACT

This thesis investigates the social and economic factors affecting small-scale forestry development in Leyte Province, the Philippines, and in particular, the potential to use typologies of rural households to aid the description and interpretation of the diversity of households in relation to forestry development.

Data for the analysis of the relationships between socioeconomic factors and tree management behaviour and intentions and the construction of a typology of rural households in Leyte was gathered from four case study communities on the Island. Following focus group discussions in each of the participating communities to gather background data and populate the structured interview schedule, representative samples of 50 households were selected and interviewed in each of the four communities.

Analysis of the present tree management activities of households in the four communities revealed that most households surveyed (approximately 80%) indicated that they are presently managing at least a few trees, the primary purpose of most tree management activities being to supply timber for the households' own needs. Only 10% of respondents indicated that they intend to sell trees they are presently managing, and 25% stated that they intend to plant and manage trees for the production of timber for sale in the future. Approximately 60% of responding households indicated an interest in developing commercial tree farming on the land they manage. Thus it is concluded that small-scale commercial tree growing is uncommon in the communities involved in the survey, and that many households are interested in developing their tree planting and management activities but feel constrained from participation by various factors.

The first level of exploration of the socioeconomic factors affecting rural households' tree management behaviour involved univariate analyses of the relationships between households' tree management behaviour and intentions, their socioeconomic characteristics and their attitudes to forestry. The level of resources controlled by the household, in terms of the area of the land managed by the household, their tenurial security and their cash income, are correlated with higher levels of participation in forestry activities, and greater intentions to plant higher numbers of trees in the future. Some farming system variables are also related to higher levels of tree planting and management activity, including the management of livestock

and of farm plots distant from their house. While control over higher than average levels of productive resources are, in general, positively correlated to the active management of trees on their land, there are patterns of exceptions to this trend.

The exploration of the interrelationships between socioeconomic factors and attitudes affecting households' tree management behaviour was undertaken through the definition of a typology of rural households in relation to forestry. Five types were defined, each having different attitudes to forestry activities. The interpretation of the types was undertaken by describing and comparing the socioeconomic and behavioural characteristics of the types in the typology. The types were characterised by differences in their control of productive resources, differences in their present and intended levels and types of forestry activity, and by differences in their participation in training activities run by development programs. The characteristics of the types were found to correspond highly with descriptions of the socioeconomic factors affecting forestry activities of smallholder households reported by previous studies into and theories about the socioeconomic factors affecting smallholder forestry development.

The typology of rural households does help to describe and interpret the variation within each of the four communities in terms of households' attitudes to forestry development and their socioeconomic characteristics. It is concluded that these variations between households mean that the various types of households will be affected in different ways by forestry development programs. It is also concluded that the present state of forestry policies and the market for timber products is such that substantial increase in the level of forestry activity by smallholders is unlikely without comprehensive land use planning, policy reform in regards to tree registration and transport permits, and market development. Recommendations for further research and policy development arising from the thesis focuses on the need to create enabling conditions in which forestry activities can occur and on ways to address the differing needs of the various types defined in the typology.

Abbreviations Used in the Thesis

A & D – Alienable and Disposable Land
ADB - Asian Development Bank
CBFMA – Community-Based Forest Management Agreement
CBFMP – Community-Based Forest Management Program
CBRMA – Community-Based Resource Management Agreement
CO – Community Organisation
DA – Department of Agriculture
DAR – Department of Agrarian Reform
DENR – Department of Environment and Natural Resources
FAR – Family Approach to Reforestation Program
FGD - Focus Group Discussions
GDP – Gross Domestic Product
GTZ – German Tropical Ecology Program
ISFP – Integrated Social Forestry Program
KAHOI – Kapunungan sa mga Yanong Mag-uuma sa Kakahoyan sa Inopacan
LGU – Local Government Unit
LSU – Leyte State University
NGO – Non-Government Organisation
NSO – National Statistics Office
NSCB – National Statistics Coordination Board of the Philippines
PEOPLE – Partnership for Ecological Orientation and Preservation of Leyte's Environment Inc.
PO – Peoples Organisation
PRA – Poting Bato Reforestation Association
PROFEM 1 – Communal Tree Farming Program/ Program for Forest Ecosystem Management
RISFFA – Rizal Integrated Social Forestry Farmers Association
RUDA – Rizal Upland Developers Association
SPSS – Statistical Program for Social Sciences
TLA – Timber License Agreement
UDWG – Uplands Development Working Group
USAID – United States Agency for International Development
USDA – United States Department of Agriculture
UQ – University of Queensland
VALUES – Visayan Association for Livelihood and Upliftment of Ecological Systems
WALLTREBA – Waterloo, Anahaw, Lunas, Lowan, Tigbao Reforestation Beneficiary Association (Inc.)

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Chapter 1

THESIS INTRODUCTION AND OVERVIEW

This chapter provides an introduction to and overview of the thesis. In the first section the current status of forestry in the Philippines is briefly described. The second section presents the research problem and research questions addressed by the thesis. In the third section the justification for the thesis is examined, and in the final section an overview of the structure of the thesis is presented.

1.1 INTRODUCTION

Forest management in the Philippines has changed markedly over the past thirty years and continues to evolve, from a position where logging corporations controlled a third of the entire land area of the country in the 1970s, to a point where a sixth of the total land area is now under the management of community organisations in partnership with government agencies. The changes to the forestry sector have been huge, and they need to be, as the problems facing the Philippines environment and economy are serious.

The natural forests of the Philippines have been largely cleared since the beginning of the 20th century. Deforestation has been extreme and has adversely affected the state of natural and rural resources throughout the Philippines. Forest products were, until the early 1990s, largely sourced from natural forests. Concern over the environmental impacts of the logging activities, including catastrophic flooding and soil erosion, and the social inequity of allowing corporations to utilise the natural forests for minimal public benefits, resulted in the banning of logging these forests in the majority of Philippine provinces in the 1990s.

Since these logging bans the imports of wood products have grown annually (UNFAO FMBDENR 2003). The establishment rates of timber plantations and the productivity of these plantations has failed to keep pace with demand for timber products, with timber production in 2000 just a fraction of what was projected in the 1990 Master Plan for Forestry for the Philippines (UNFAO FMBDENR 2003). At the same time deforestation rates are estimated to have remained at more than 100,000 ha per year since the 1980s (UNFAO FMBDENR 2003). The main drivers of deforestation in the past and at present have been described as a combination of high population density, high population growth rates, a highly inequitable distribution of wealth and a lack of economic development (Kummer and Sham 1994, UNFAO FMBDENR 2003). While poverty levels are reported to have fallen slightly in urban areas since the 1990s, poverty still afflicts more than 50% of households in rural areas (Balisacan. and. Pernia 2002, NSCB 2003). This places tremendous pressure on natural and rural resources, and limits the financial resources available to devise and implement sustainable land management programs.

The forest management programs of the Philippines are presently led by the Community Based Forest Management Program. This program has multiple policy objectives, including reforestation of inappropriately cleared land, prevention of further land clearing, encouraging small scale forestry and assistance in the provision of sustainable livelihoods for millions of households that are located in the mountainous upland regions of the country. While the objectives of the Community Based Forest Management Program are laudable, because of the history of forestry and lack of economic development in the Philippines, there remain many challenges to the programs' success on the ground.

The amount of land area covered by community based forest management agreements has increased rapidly in the last 10 years and these agreements presently cover more than 5 M ha, more than half the land area officially classified as 'forestland' in the Philippines. While the changed paradigm of forest management in the Philippines is, in theory, helpful for the economic and social development of rural households, and potentially helpful to ameliorate the environmental problems confronting the nation, there remain a number of problems confronting the operation of the programs on the ground. According to reviews of the operations of the community-based forest management programs, many of the projects have not succeeded in meeting the objectives set for them (Hyde et al. 1996, Bisson et al. 1997, Tesoro 1999, Guiang 2001b, UNFAO FMBDENR 2003). Management of these projects is reported to be highly variable in quality, and most of the community organisations in charge of these projects struggle once they lose support from outside agencies. In addition, there appears to be very little adoption of commercial tree farming by small-holders outside the areas covered by the agreements.

The reasons for these failures are likely to be due to a combination of social, economic and policy factors. Previous research has reported that households' lack of financial resources is a critical constraint to the development of small-scale forestry. Not all households in rural areas of the Philippines are financially constrained, however, and previous research has identified that Philippines forestry policies, although improved, are another constraint to small-holder forestry development (Utting 2000). The dilemma facing those designing and administering development programs is that not only are there an array of factors affecting households land management decision-making, these factors vary in their influence across the community. Many researchers and extension personnel who have studied development programs have argued that decision-makers and extension providers need to understand the variety of socioeconomic circumstances and value systems in the community, how these differences affect their land management attitudes and behaviour, and how the differences lead to variation in the impacts of policies and programs across the community (Chamala et al. 1980; Byron and Boutland 1987; Chamala 1987; Raintree 1987, 1991; Cernea 1992; Emtage 1995; Byron 1996, van den Ban and Hawkins 1996; Bisson et al. 1997; Howden et al. 1998; Landais 1998; Pulhin 1998; Emtage and Specht 1999; Guerin 1999; Fulton and Race 2000; Howden and Vanclay 2000; Emtage et al. 2001).

1.2 RESEARCH PROBLEM ADDRESSED BY THIS THESIS

It is desirable to have extension personnel consider the individual circumstances of landholders, yet policy-makers cannot hope to take every individual into account when designing extension programs. They have to find a means to identify and describe the diversity by identifying, if possible, patterns of varying needs, behaviours and socioeconomic circumstances in the community and the relationships between them. The main research problem addressed by this thesis is:

Can the social and economic factors that affect the development of small-scale forestry in the Leyte Province, the Philippines, be identified, and how can the social and economic diversity in rural communities be defined and described so as to assist in the design and delivery of rural and natural resource management development programs?

Anthropologists, marketing professionals and those tracking public opinions seek clusters or groups of people in the community with similar attitudes and use typologies to describe and comprehend the relationships between the characteristics of the various types they have defined. In the field of rural and natural resource management, typologies can help to improve understanding about how development programs will affect landholders in differing social and economic circumstances and with differing value systems. The purpose of typologies is to go beyond description of variation to interpretation of the types. The rationale behind the use of typologies is that they can assist understanding and description of the variation in the community by improving understanding of the relationships between various combinations of socioeconomic characteristics and differences in land and tree management behaviour. This understanding can then be applied to help to target extension programs and communication strategies, as well as aid strategic planning for the development of the timber industry and conservation planning at a regional scale (Chamala et al. 1980; Byron and Boutland 1987; Raintree 1991; Emtage 1995; van den Ban and Hawkins 1996; Howden et al. 1998; Specht and Emtage 1998; Emtage and Specht 1998; Guerin 1999; Byron 2000; Fulton and Race 2000; Howden and Vanclay 2000).

The main research questions addressed by this thesis are:

'What are the social and economic factors affecting the development of small-scale forestry programs in Leyte Province, the Philippines?'; and

'It is possible to develop a typology to define and describe the variations in tree planting and management attitudes and behaviour within rural communities in the Philippines in a manner that will assist in the design and delivery of small-scale forestry development programs'.

1.3 JUSTIFICATION FOR THE RESEARCH

The focus of this thesis is important and contributes to the body of knowledge about the influence of social and economic factors on tree management practices for two main reasons. First, it is the most comprehensive investigation of its kind undertaken in the Philippines in terms of quantitative research and the application and reporting of statistical analyses. Secondly, it seeks to address particular concerns expressed by a number of researchers regarding the lack of understanding about the diversity of rural households.

The importance of the influence of socioeconomic factors on the tree management practices of smallholders in the Philippines is well recognised and has been investigated on a number of occasions (Belsky 1984, Aguilar 1986, Ponce and Bangi 1988, Ngidlo 1990, de los Angeles and Ygrubay 1992, Sajise and Briones 1996, Nasayao and Zara 1997, Carandang et al. 2000, Stark et al. 2002). These studies have improved understanding of the relationships between tree management activities and socioeconomic factors in the Philippines, and are reviewed in Chapter 7, but they have a number of limitations. The majority of the studies above have relied exclusively on descriptive statistics and have not tested the relationships in a rigorous manner. Those studies that have used inferential statistical tests include Belsky (1984), Ngidlo (1990), de los Angeles and Ygrubay (1992) and Nasayao and Zara (1997). With the exception of Ngidlo (1990), the inferential statistical tests they used are limited to bi-variate analyses. These analyses have failed to investigate the interactions between socioeconomic factors which, given the diverse and interrelated factors affecting forestry activities of small-holders, are likely to be significant. Furthermore the reporting of these studies has, in the majority of cases, been limited to brief articles.

The study presented in this thesis is comprehensive in that it applies rigorous statistical testing of relationships between socioeconomic characteristics of households and a variety of measures of households' tree planting and management attitudes, behaviour and intentions. It is one of the few studies that have combined the analysis of survey data with extensive literature reviews to identify the socioeconomic factors reported to influence tree management behaviour and develop an understanding of the context in which the activity occurs.

The construction of typologies to aid the design and delivery of natural and rural development is increasing in popularity due to their potential to aid the description and interpretation of diversity in rural households. Typologies of rural households in relation to forestry, defined according to the forest management objectives of the landholders, have been developed for a number of European countries and in some regions of Australia. A review of relevant literature revealed that this approach had not been trialled in the Philippines or other developing countries prior to this thesis. While typologies of upland farmers in the Philippines and elsewhere in South East Asia have been developed in the past in relation to agriculture, the last typology found in the literature review was developed in the 1980s (Belsky 1984). Social, environmental, and economic conditions have changed in the Philippines since that time. These typologies were focussed more towards agricultural practices rather than the management of trees in the rural landscape. Thus it appears that a new typology of rural households in Leyte in relation to forestry practices could be useful in aiding the planning and administration of forestry development programs.

1.4 METHODOLOGY

Tree management is only one option available to provide a source of livelihood for rural households. Previous research has highlighted that that it is important to consider how tree planting and management is used or could be used in conjunction with agricultural activities and off-farm employment opportunities if tree management programs are to be developed that are both socially acceptable and economically feasible, particularly in developing countries (Raintree 1987, 1991). Thus it is important to understand the social and economic context in which tree management activities occur to understand the potential opportunities for forestry development.

The methodology employed for this thesis used a combination of qualitative and quantitative techniques to generate and analyse data about the livelihood practices of households, their attitudes to forestry activities and community organisations, and their present and intended tree management behaviour. Primary data collection activities included community meetings, focus group discussions, and structured interviews of 50 households from each of four rural communities in Leyte Province, Philippines.

An extensive literature review was also carried out. This review examined:

- previous studies of and theories about social and economic factors affecting small scale and community forestry programs in the Philippines,
- the development of typologies to assist natural resource management world-wide, and,
- the social and political history of the Philippines.

Prior to commencing the household interviews, community meetings were held in the four communities to discuss the nature of the research, to inquire about the history of forestry in the areas, and to ask the community members if they wished to participate in the research. Following agreement to participate in the research, focus group discussions were next held in each of the communities. In these FGDs the topics discussed related to the communities' history, the socioeconomic characteristics of the households in the communities, and their experiences with forestry development and community development in general.

Data collected during these initial FGDs was then used to help set-up structured interview schedules for individual households. The household interviews generated a massive quantitative data set which includes more than 200 cases with over 1500 variables per case. Data collected during the household interviews included detailed information about the demographic characteristics of the household members, their sources of livelihood, in particular their farming activities, their attitudes to various potential reasons for and constraints to tree planting and management on the land they currently manage, and their present and intended tree planting and management activities on land they manage.

The responses to the household surveys have been analysed using series of univariate statistical tests to assess the relationships between social and economic factors and tree planting and management attitudes and behaviour. Following these analyses, cluster analysis techniques were used to group together those respondents with similar attitudes to forestry development. The socioeconomic characteristics of the resulting cluster groups have been compared, using uni and multivariate statistical tests, to ascertain relationships between the variations in the attitudes, behaviour and the socioeconomic circumstances of households within the communities. The cluster groups were also used to estimate the likely response of the groups to various potential incentives and community development options.

Once the data had been analysed, a series of reports which summarised the findings from the initial FGDs and household surveys were prepared for each of the four communities involved in the research. These reports were presented orally and in written form to each of the communities during a second round of validation FGDs. During these FGDs community members were able to ask questions about the research and the findings and provide feedback to the researchers about the conclusions that had been drawn. Finally, a workshop was held at Leyte State University to discuss the policy implications of the research. The workshop included participants from each of the communities involved, together with representatives from the Local Government Units, and the national government agencies associated with land management (including the Departments of Environment and Natural Resources (DENR) and the Department of Agrarian Reform (DAR)).

1.5 LIMITATIONS OF THE STUDY

The study undertaken for this thesis does have a number of limitations in terms of the ability to extrapolate the findings from the study and the design and interpretation of the results of the survey and subsequent analyses in a culture foreign to that of the author. The communities involved in the research were not selected on a random basis for a number of reasons. These reasons include security concerns for foreigners in remote areas of the Philippines, and the time constraints on the research meant that the times taken to build-up trust with community members was not available. Consequently the communities that were approached to participate in the research program had previous contact with the Faculty of Forestry at Leyte State University, and all had some previous involvement in community based forest management programs. Attempts were made to select reasonably representative communities in terms of their geographic locations and their cultural backgrounds. Two of the communities are situated in the lowland regions and two in the uplands, and one community is located on the east coast of the Island, dominated Waray speaking peoples, whereas the other communities are in Visayan speaking areas. Attempts were also made to compare the demographic characteristics of the communities with those of the entire province where possible so as to assess any sampling bias.

The issues surrounding of cross-cultural communication, with the potential to both ask the wrong questions plus misinterpret the results of the survey, were of considerable concern. These issues were addressed by:

- ensuring that a thorough literature review was carried out;
- through continued discussions with experienced Filipino researchers throughout the design and administration of the survey; and
- through the use of focus group discussions to both provide back ground information and assist in the validation of the interpretation of the survey responses.

1.6 THESIS OVERVIEW

This thesis is comprised of 15 chapters. The background information about community development and natural and rural resource management issues in the Philippines are reviewed in Chapter 2, including a brief history of the development of community and social forestry in the Philippines, and an introduction to the communities involved in the research. In Chapter 3 the use of typologies to aid natural and rural resources development programs is examined, together with theories used to understand and guide the promotion of sustainable land management practices. Previous studies that have used typologies to aid natural and rural resource development programs are reviewed in Chapter 4, and the implications of these studies for the thesis are discussed. In Chapter 5 details about the methodologies used for the surveys and analysis of the responses are described and discussed. In Chapter 6, the operation of the current community forestry programs is examined through an examination of the various roles of stakeholders involved in forest land management. The previous surveys of smallholders' forestry attitudes and practices in the Philippines are reviewed and discussed in Chapter 7. A summary of the findings from the initial focus group discussions held in the communities that provided background and supporting data for the household interviews is presented in Chapter 8, and the communities' experiences with community forestry programs are described. The responses to the household interviews and their analysis are presented in Chapters 9 to 14. In Chapter 9 the first results of the household surveys are described, including the demographic profile of the communities and results of testing for relationships between socioeconomic characteristics and variations in tree management behaviour. In Chapter 10 the results of a principal components analysis of households' perceptions of the importance of various potential reasons for and constraints to tree planting the implications of the findings are discussed. Chapters 11 to 13 present the results of tests for relationship in socioeconomic characteristics and behaviour of households. The results of the cluster analysis of respondents according to their ratings of importance for various reasons for and constraints to tree planting and management are described in Chapter 14. In Chapter 15, the findings from a workshop used to disseminate the findings from the household and community survey and generate recommendations for improving the policies relating to smallholder tree management are presented. In the final chapter, the implications of the study findings for the development of small-scale forestry in Leyte are discussed, and recommendations are made for future research on the topic.

Chapter 2

FOREST MANAGEMENT AND COMMUNITY DEVELOPMENT ISSUES IN THE PHILIPPINES AND LEYTE PROVINCE

There have been great changes in the South East Asia region over the last 50 years. The changes that have occurred in the economic and social lives of peoples in South East Asia have varied between nations and between urban and rural areas. In the Philippines, a confluence of political, social, environmental and economic factors have resulted in severe pressure on the natural resources of the nation, particularly the resources in the upland areas of the country. The vast majority of the forest resources of the Philippines are now cleared or highly degraded, and the soil resources are under intense pressure due to a combination of the inherently fragile nature of upland soils and a lack of alternative opportunities to secure livelihoods for millions of people.

In this chapter the socio-political issues surrounding forest management and community development in the Philippines are examined. The chapter commences with a description of the context of environmental management in South East Asia. The first section examines economic and community development in the Philippines, with a focus on the agricultural sector, and the links between agriculture and poverty. In the second part of the chapter, the issues relating to natural resources management in the Philippines are briefly examined. Here the focus is on the relationships between the loss of natural forests in the Philippines and socioeconomic factors operating in Philippines society. In the third section of the chapter a brief history of forestry in the Philippines is presented, examining the evolution of forest management through the colonial periods of administration by the Spanish and Americans, through to the beginning of community forestry programs. In the fourth section the development of community forestry programs in the Philippines is examined. In the final section of the chapter the province and communities that were involved in the research for this thesis are introduced. This section provides background demographic and economic information about Leyte Province, the study site for this thesis.

2.1 COMMUNITY DEVELOPMENT ISSUES IN THE PHILIPPINES

Political changes across South East Asia in the past 50 years include the withdrawal of European colonialists, periods of communism in some countries, civil wars and conflicts in many places, and the spread and development of democratic institutions. The economies of the countries in South East Asia have also changed markedly, from largely subsistence economies reliant on the export of unprocessed agricultural and forestry products, to a situation where some of the countries, including Taiwan, Singapore, and to a lesser extent Thailand and Malaysia, have growing manufacturing and service industry sectors. To some extent all of the countries have reduced their degree of reliance on the agricultural sector of the economy, including Indonesia and the Philippines, but the economic development of the fast growing ‘tiger’ economies has not been replicated evenly across the region. While the Philippines has experienced the growth of a ‘mega city’ in the expansion of Metro Manila, the rate of growth in non-agricultural sectors of the Philippines economy has not matched that of some other South East Asian countries. The Philippines has fallen from having the third highest GDP per capita in the South East Asian region in the 1950’s to become one of the poorest countries in the region due to slow growth, a lack of industrial development, and extreme inequality in the distribution of wealth (Cramb 2000).

2.1.1 Population Growth and Industrialisation in the Philippines

The total population in the Philippines was estimated to be approximately 77 M people in 2000, and is expected to double by the year 2030 (NSCB 2003). Population density in the Philippines is second only to Singapore in the South East Asian region, at 220 people/km^2 (Asian Development Bank 1996). The population growth rate in the Philippines was the highest in Asia through the early 1990s and continued to rise over the late 1990s (NSCB 2003). In the mid-1980s the population in upland areas was estimated to be about 18 M, one third of whom are non-hispanicised indigenous peoples whose ancestors have traditionally lived in upland areas. The remainder are lowland-farmers who migrated to the uplands over the last few decades attempting to secure their livelihood (Cruz and Zosa-Feranil 1988).

Opportunities for rural households to reduce their dependency on farming to provide a livelihood are limited and have failed to expand in recent years. Although the industrial sector of the economy has grown to the extent it that accounted for 33% of the GNP in 1994, this sector accounted for only 15% of employment. On the other hand, the agricultural sector made up 22% of GNP in 1990, and still accounted for 46% of employment in 1994 (Asian Development Bank 1996). The agricultural sectors proportion of the GNP dropped to 37% in 2003, largely due to expansion of the services sector (NSCB 2003). The opportunities to expand the industrial sector of the economy are presently diminishing through competition with countries that have very low wage levels, including Vietnam and China (Asian Development Bank 1996). Employment in the industrial sector grew minimally to 16% of total employment, with employment in service industries now accounting for 47% of the total, in 2003 (NSCB 2003).

2.1.2 The Agriculture Sector and Poverty in the Philippines

The industrialisation of agriculture has led to changes in the agricultural sector, with the promotion and adoption of agricultural technologies dramatically increasing the productivity of parts of the agricultural sector in the Philippines (Otsuka et al. 1992). While the industrialisation of agriculture improved the livelihoods in some rural areas for those households with secure land titles that can gain access to capital (Angeles-Reyes 1987), rural households remain far more likely to have income levels below the poverty threshold than those in urban areas. In Region 8 of the Philippines for example, which includes Leyte province, the study site of this thesis, it is estimated that 27% of urban households and 50% of rural households are below the poverty threshold (Table 2.1).

Table 2.1. Average annual income by region and provinces and poverty thresholds and incidence in Region 8 and Leyte Province

	Income level (Ph P)	
Income measure	Region 8	Leyte
Average annual family income (2000)	91,520	106,567
Annual per capita poverty thresholds (2000)	10,783	
Urban	12,011	
Rural	10,287	
Poverty incidence of families (2000)	43.6%	
Urban	27.1%	
Rural	50%	

(Source: Philippines National Statistics Coordination Board (NSCB) (2003). Income figures are in Philippine Pesos. US$1=Ph P 50 approximately)

The promotion and adoption of improved agricultural practices has, like industrialisation, varied greatly between and within countries in South East Asia. Many households that rely on farming for both subsistence and cash income have not adopted modern farming practices. Those that have, adopted modern practices have been able to out-compete those using traditional practices, a factor that has served to increase the inequity of income and land ownership distribution in the Philippines (Angeles-Reyes 1987). This has helped to exacerbate the already concentrated land ownership patterns that had been established under Spanish rule and reinforced through the cronyism of the Marcos regime and other presidencies (Agoncillo 1990). The concentration of ownership of land is particularly acute in highly productive agricultural lands (Monte and Lim 1996, cited in Cramb 2000). The average area of agricultural holdings doubled in the period from 1948 to 1980 despite the growth in the population (DENR 1990). The concentration of land ownership resulted in even greater pressure on people to seek new lands for agriculture in the publicly controlled uplands (Ganapin 1986, Angeles-Reyes 1987, Cruz et al. 1988, Pulhin 1998, Cramb 2000).

An agrarian reform program has been operating in the Philippines since 1972 in an attempt to give greater access to land to rural households and reform tenancy arrangements. The agrarian reform program was expanded in 1988 but has made slow progress so far, with considerable opposition from wealthy landowners in the government and throughout civil society (Saulo-Adriano 1991, Llanto and Dingcong 1991, Cramb 2000, Stevenson et al. 2003). The programs have thus far concentrated on publicly owned land, with the estates of privately-owned land more difficult to redistribute. Various methods are employed by landholders with large areas of farmland to avoid being affected by agrarian reform, including the use of private militia forces and a sometimes-corrupt legal system. Cases have occurred in Leyte where farmers were jailed for harvesting coconuts on land for which they had been granted official land certificates under the agrarian reform program (Oliveros 1997). The size of the population and concentration of land ownership is so extreme in many areas that there is unlikely to be sufficient land to supply all the households in need.

The official statistics on landlessness may be misleading if viewed in light of the reality that approximately half of the area that is classified officially as public forest land is in fact cleared farm land (de los Angeles 2000). An informal but nevertheless operative de facto system of land ownership and trading exists on these lands (Cramb 2000). While the distribution of land tends to be more equitable in the uplands than in lowland areas, it has even happened that within the upland communities a new class of tenanted farmers is being formed and the sharp divisions in wealth evident in the lowlands is being replicated in the upland areas (Cruz et al. 1988).

2.2 NATURAL RESOURCES MANAGEMENT IN THE PHILIPPINES

The natural resources in the Philippines and elsewhere in Asia are under great pressure from high population densities, economic underdevelopment, and continued high population growth, and it is apparent that many areas are becoming severely degraded (de los Angeles 2000). When the Spanish first came to what is now known as the Philippine archipelago in 1565, their chroniclers reported that at least 90% of the total 30 M ha of land had forest cover (Guiang 2001a). Since then the forest cover in the Philippines has fallen dramatically, to about 49% of land area in 1950, and presently stands at approximately 18% (Guiang 2001c, UNFAO DENR 2003).

The reduction in the forest cover of the Philippines upland areas has affected the economy, the environment and Philippine society. There are major problems associated with the soil erosion and the loss of agricultural productivity of upland areas. Soil erosion has led to the degradation of waterways which affects infrastructure including dams and hydro-generators as well as fisheries. There have been increases in natural disasters including flooding and mud slides, while clearing of catchments has been blamed for causing reductions in the continuity of water resources vital for irrigation of crops. There has also been a considerable loss of biodiversity for a nation which was once considered as having unique and mega-diverse ecosystems. The timber industry was a major source of revenue for the Philippines national economy, particularly following the withdrawal of the United States of America in 1948 until the 1980s. The Philippines is now a net importer of timber products (de los Angeles 2000).

2.2.1 Forest Loss in the Philippines

The native dipterocarp forests have been the most targeted of all forest types. These forests have been cleared or severely degraded through inappropriate logging practices used to extract high value dipterocarp species which were sold in the international marketplace. It has been estimated that only 30% of the former total of 10 M ha of dipterocarp forests were still standing in the Philippines in the early 1980s (World Bank 1989). Estimates of the deforestation rate in the Philippines range between 150,000 and 320,000 ha/year during the 1980s (Kummer et al. 1994, World Bank 1996), and continues to exceed 100,000 ha per year (UNFAO DENR 2003). Just 18% of the total land area retained forest cover in 1999 (ESSC 1999). Some studies reviewed by Guiang (2001a, 2001c) project that this level of cover could be reduced to just 10% of the land area by the year 2010.

2.2.2 Land Resource Degradation in the Philippines

The growing population in the Philippines has, in many places, moved into areas that are often geologically young and have steep slopes - areas that are very susceptible to erosion when subjected to continuous cultivation (Garrity 1998). Studies of soil erosion rates across the world in the mid 1980s highlighted the extent of the problems facing agriculture in South East Asia, with reports that the soil erosion rates and transportation of soil into the oceans was an order of magnitude greater in South East Asia than in any other region of the world at the time (Milliman and Meade 1983, cited in Garrity 1998).

Studies of the rate of soil loss in areas with slopes greater than 8% in the Philippines have estimated that 80mt/ha/yr of soil were lost through the 1980's, and that soil degradation rates have been increasing (de los Angeles 2000). The financial cost of soil resource degradation in 1988 was estimated to be P334 million in 1988, rising to P906 million in 1999. Studies have projected that some areas in the Philippines will have lost their entire soil resource within the lifespan of the current human generation (de los Angeles 2000).

The off-site effects of the soil erosion in upland areas on agricultural production, livestock enterprises, productivity of coastal fisheries and water supplies are also huge and thought to be increasing in magnitude (de los Angeles 2000). The financial impacts of soil erosion have increased, with the siltation of irrigation systems for lowland rice production estimated to have cost P11 million in 1988, rising to P1.2 billion in 1997 (de los Angeles 2000, p. 5). Major water supply reservoirs can also be affected by siltation, with one estimate that the value of these resources was reduced by P51 million in 1988 (de los Angeles 2000, p. 5). Much of the degradation of soil resources and the associated off-site impacts have been attributed to inappropriate clearing of forests in upland areas (Garrity 1998).

2.2.3 Understanding the Loss of Forests in the Philippines

A complex combination of social and economic factors has led to the reduction in the forest cover of the Philippines. Forest loss is a reflection of the web of other environmental, social and economic issues that confront the nation. Kummer and Sham (1994) surmised that the deforestation in the Philippines was a two-step process, with logging converting primary forest to secondary forest, followed by farmers converted secondary forest to agricultural land. Thus the deforestation is a result of the operations of logging corporations and '… the spread of agriculture. Both the granting of concessions and the spread of primarily subsistence agriculture are reflections of a development process that has concentrated resources in the hands of a small elite and left the majority of Filipinos in poverty.' (Kummer and Sham 1994, p.158). It is estimated that 60% of the area of forest cover lost resulted from swidden or 'slash-and-burn' agriculture in logged-over areas, with 30% of the loss coming from the expansion of other agricultural activities (Guiang 2001a).

A continuing problem is the inability of government agencies charged with management of forests to control the use of these areas. The State laid claim to the natural resources in the majority of upland areas under Spanish rule, a situation that has been continued by administrations to the present day. In 1975, all land with a slope of greater than 18 degrees was officially classified as publicly owned forestland, covering more than 60% of the Philippines (Gibbs et al. 1990, Asia NGO Coalition 1991). Under the current constitution that was drafted in 1987, the State retains official ownership of forest lands. Most of these upland areas have rugged terrain and are difficult to patrol. Historically the managing agencies assigned to protect the areas from exploitation have lacked the resources to police them. They were and still are effectively open access areas, despite laws enacted to prevent people from practicing farming on land officially classified as 'forest'. The reality is that approximately 50% of officially classified forestlands are in fact cleared farmed land (de los Angeles 2000).

2.2.4 Responses of Philippines Governments to Forest Loss Problems in the Philippines

The response of the Philippines government to the loss in forest and soil resources - with prompting and assistance from Filipino development workers and researchers, other national governments, and international lending agencies - has been to ban logging in the majority of forest areas, and to initiate a series of community forestry programs and programs to encourage small-scale forestry and agroforestry.

The community-based forest management programs have been designed to encourage the revegetation of areas for a number of reasons, including the conservation of biodiversity, stabilisation of soils, diversification of agriculture and provision of timber. The programs are supposed to provide a mechanism for the granting of tenure security to households that continue to utilise land officially designated as public forest land. The guiding philosophy of community forestry projects in the Philippines is to give custodianship of forest lands to the communities that live in and near them so that they feel a sense of ownership of the forests. The rationale of this approach is that once communities and households that use forest lands are given security of property rights to these lands and plants they will work to properly manage them sustainably in a manner that will benefit the communities and society at large. The motto of the Community Forestry Program of the Department of Environment and Natural Resources (DENR) is ‘people first and forestry will follow’ (DENR 1998).

The Philippines has a relatively long history of implementing social and community forestry programs, and is recognised a world leader in terms of their policy development. Community and social forestry programs have been trialled since the early 1900s and have been operating consistently in the Philippines since the 1970s. These programs now cover an area of 5.3 M ha (Guiang 2001b). Approximately 50% of this area is covered by Certificates of Ancestral Domain Claims, which are titles given to communities of indigenous peoples. Community Based Forestry Management Agreements awarded to community organisations cover almost 2 M ha or 35% of the total area, and Certificates of Stewardship and Certificate of Forest Stewardship Agreements cover approximately 0.8 M ha, and have been awarded to nearly 450,000 households across the Philippines (Guiang 2001b).

Despite the advanced status of the policies guiding community and small-scale forestry programs and the areas covered, reviews of the programs continue to report few success stories and a number of challenges to implementation (Johnson 1997, Bisson et al. 1997, Pulhin 1998, de los Angeles 2000, Donaghue 2001, Guiang 2001a and b). Commonly cited problems with the design and administration of community forestry programs include the lack of experience of poor and under-educated communities in developing and administering projects, the lack of continuous support for the projects, the complexity of regulations applying to forestry management, and the failure of community forestry projects to develop alternative livelihood activities for rural households that will reduce their dependency on exploiting forest lands. Foremost of these problems according to researchers such as Pulhin (1998), Donaghue (2001) and Guiang (2001a, 2001b) is the failure of the projects to ‘empower’ communities to undertake and manage forestry projects. One cause of this failure, and the focus of this thesis, is the lack of understanding of the diversity of needs of households in participating communities.

2.3 A HISTORY OF FORESTRY IN THE PHILIPPINES

The timbers from the Philippines were, for a time, in great demand for their quality for cabinet making. Huge fortunes have been made by corporations from timber in the Philippines but, the high-quality timber is now largely removed, and the former forest land in the Philippines is now largely under cultivation or else degraded. This section examines the history of forestry and forest land management in the Philippines from the time of Spanish colonisation in the 1500s, through the period of American administration from 1900 to the 1940s, the period from 1948 to the 1970s dominated by timber license agreements between corporations and the national government, and the period from 1980 to the present that has seen the development of community forestry. The section provides information about the evolution of the forest land management through periods of colonial management, privatisation and community management. It serves as background information for Chapter 6, which examines the present management of forest lands.

At the time of the ‘rediscovery’ of the Philippine archipelago in the 1521 by Magellan, the islands of the Philippines were largely covered by forests. The interiors of the islands are mountainous and were sparsely populated by indigenous communities that lived mainly in isolation from each other. These communities supported themselves through practicing extensive swidden or slash-and-burn agricultural practices, moving their gardens from year to year as the soil resources in the high rainfall conditions quickly lost their fertility under cultivation. An exception were the Muslim communities of Mindanao island in the south of the Philippines, who did not shift their housing, practiced extensive cropping of hemp, and formed inter-community alliances (Jocano 1998a). The lowland areas of coastal plains of the Philippines were more densely settled than the interiors, having been settled by waves of migrants from mainland Asia, the Malaysian peninsula and Indonesia. These migrants arrived in boats known as ‘barangays’, a term that was subsequently applied to name the communities that formed on the coastal areas (Agoncillo 1990). These communities supported themselves through the growing of rice, supplemented by fishing in the tropical seas around the islands. After their early exploration of the Philippines, the Spanish eventually conquered the country with relative ease due to the lack of alliances between communities. The Spanish then established a system of colonial rule that was designed to milk the rich natural resources of the nation.

2.3.1 Philippine Forestry Under Spanish Administration

In 1565 the Spanish colonisers claimed the land areas of the Philippines and their natural resources as the property of the King of Spain under the Regalian Doctrine, although few Spanish people settled far from the coast and river systems (Lynch 1987, cited in Guiang 2001a). By 1900, the Spanish had granted 0.5 M ha of forestlands to private owners, with 17 M ha declared as State-owned (Lynch 1987, cited in Guiang 2001a). The Spanish colonisers established large estates or 'haciendas' in the Philippines to produce agricultural products for export. They ran their administration with the assistance of an 'elite' class who helped them to control the local populace in return for economic and social advantages (Ganapin 1986, Agoncillo 1990). While the mountainous areas of the Philippines had retained most of their forest cover, the Spanish land laws weakened the operation of traditional Filipino systems of land tenure in the areas most suited to agricultural development. The expansion of land under crops (including sugar cane, tobacco and corn), the establishment of plantation estates, the expanding timber industry, shipbuilding, church construction and tobacco-curing activities all led to the clearing of forests in the period before 1900 (Guiang 2001a). The system of Timber Concession Areas or timber license agreements that were begun by the Spanish in 1863 under their forest management agency, the Inspeccion General des Montes, were then extended when the Philippines came under American rule (Poffenburger and McGean 1993).

Throughout the period of the colonial occupation of the Philippines, the rights of the local and indigenous peoples to access forest resources were greatly restricted. In 1889 the King of Spain declared that kaingin farming (otherwise known as 'swidden' or 'slash and burn' agriculture) was illegal in public forests and outlined penalties for those caught. The American administration passed the *Kaingin Law (1901)*, which also imposed penalties on those caught illegally kaingin farming. In 1935 the first Philippine constitution under the independent Philippine Republic reaffirmed that all forestlands belong to the State. This further weakened the rights of many indigenous and local communities to access forest areas. In 1963 the *Kaingin Law* was revised, but the severe penalties for illegal forest occupancy and kaingin-making activities were retained. The Philippine governments have thus consistently recognised the importance of limiting deforestation and supported some reforestation efforts.

2.3.2 Philippine Forestry Under American Administration

Faced with the prospect of defeat by rebelling Filipinos in the 1890s, the Spanish Government decided to sell the Philippines before it could be recognised as an independent nation state. Forest cover was estimated to be 70% of the total land area of 30 M ha in 1900 (ESSC 1999) when the United States government purchased the Philippines from Spain for US$20 M. The Americans, recognising the potential economic value of Philippine forests and mineral resources, began to exploit these natural resources as well as exporting agricultural products (Ganapin 1986). They extended the system of Timber Concession Areas or Timber License Agreements that were begun by the Spanish. The American administration turned the Inspeccion General des Montes agency into the Forestry Bureau in 1900, and by 1902 they had issued over 600 licenses to harvest timber from the native forests (Lynch 1987, cited in Guiang 2001a). The Americans, while interested in exploiting the Philippine timber reserves, were also sufficiently concerned about the pace of deforestation to establish the Los Baños Forestry School in 1910, and to start numerous reforestation projects in the period up to World War 2 (Esteban 1985).

Despite claiming the forest lands for the State and expanding the TLA system, some recognition of the rights of local people to access forest resources did occur under the American administration. In 1917 legislation was enacted that established some communal forest areas that could be used by local communities, but these areas remained ultimately under State control. Parts of these areas that were highly suited for agriculture were eventually reclassified as ‘alienable and disposable’, allowing them to be titled and sold (Makil 1982, cited in Guiang 2001a). It was not until decades after the Americans withdrew, however, that the government attempted to address the loss of forest cover due to ‘illegal’ swidden agriculture by working with communities rather than trying to simply ban swidden agriculture in lands that had been classed as ‘forest’. This began the paradigm shift in the way forests are managed from a regulatory to a participatory approach.

2.3.3 Forestry Following Philippine Independence

The reduction in forest cover accelerated following World War 2 with an abundance of heavy equipment available in the islands after being abandoned by the Japanese and US forces. In 1948 the American administrators formally withdraw from the Philippines after the granting of national independence following a period of more than 10 years of transition. In fact the Americans retained a high level of interest and involvement in the Philippines until the 1990s when the huge military presence they had maintained at the Clark airbase near Manila was finally withdrawn. They left behind a strengthened government forest management bureaucracy, and the start of a large-scale commercial timber extraction and processing industry. The Americans had introduced 'Philippine Mahogany' onto the world market, and the demand for the timber in Europe, and later Japan, was huge (Guiang 2001a). The National government strengthened its ability to control Philippine forests, and sections of the Philippine community with ties to State decision-makers were ready to exploit the valuable timber resources that still remained in the Philippines at the time of independence.

The timber industry was seen by some as a means by which the Philippines could earn capital to finance industrialisation through taxation. In 1970 the export of timber accounted for approximately 25% of the nations foreign exchange earnings (Guiang 2001a). Yet the government failed to capture much of the potential resource rent revenues for the public coffers from the timber industry in this period. Taxation rates in the form of royalties to the national government were low to begin with, and there was extensive under-reporting of the size and grade of logs, further reducing government revenues (Ganapin 1986). Most of the timber companies did little to improve the infrastructure and wealth of rural areas, paying corporate taxes to the government in Manila rather than to the municipal governments. Vested interest groups saw opportunities to enrich themselves by gaining access to timber concessions at a time when companies were not required to replant areas they logged, nor protect forest areas from encroachment at the end of harvesting operations. The granting of logging concessions as payment for political support was common and reached its peak in the 1970s during the rule of President Marcos. Industrialisation failed to occur on a large-scale, so the growing population was supported through the revolution of agricultural practices in some parts, and the expansion of agriculture into new areas (Ganapin 1986, Kummer 1992, Cramb 2000).

By the early 1970s and early 1980s, academics, NGOs and other elements of civil society realised the extent of environmental degradation occurring in the uplands, together with the poverty and lack of property rights security faced by many households. The mood in international development agencies was also changing, with agencies including the World Bank and Ford Foundation trying new 'community-based' strategies that aimed to empower communities and make them self-sufficient rather than reliant on aid funding. The most valuable timber in the Philippines had, by this stage, already been removed and had not regenerated, due to failures on the part of TLA concessionaires to fulfil their contracts, and due to the influx of migrants seeking land to farm. Facing widespread community unrest, the Marcos regime initiated the Integrated Social Forestry Program in 1982 in an attempt to redress some of the causes of the unrest. The next period in forest management in the Philippines can be termed 'the era of community based forestry'. Before this is examined, however, it is instructive to summarise the legacy of the colonial administrations on the socio-political environment of the Philippines.

2.4 AN EXAMINATION OF COLONIAL INFLUENCES ON THE STATUS OF SMALL-SCALE FORESTRY IN THE PHILIPPINES

The history of colonial powers in the Philippines and the administrations that they established has been linked to the present situation of pervasive poverty in rural areas and deforestation in the country. The inequity in the distribution of resources in the Philippines is described by Ganapin (1986) and Kummer and Sham (1994) as the fundamental cause of poverty and deforestation. Ganapin (1986) has argued that the colonial powers of Spain and the United States of America found it necessary to have the elite of the Philippine society on side to help them control the majority of the population. One way to conceptualise the way that the history colonial rule, overpopulation and under-development have combined to result in deforestation is illustrated in Figure 4.1.

Those Filipinos who cooperated with the colonial administrations were richly rewarded and accumulated wealth to the extent that, when full independence was granted after the Second World War, the Filipino elite were in best position to control the country. Since that time there have been changes in leadership of the Philippines, but these changes have been from particular families in the national 'elite' to other families in the elite. In the same way that some families were rewarded for their loyalty to the colonial powers, subsequent presidents maintained the 'Bata system', a system of cronyism, to maintain their power (Agoncillo 1990). Large logging concessions were granted to those who had personal connections with ruling families.

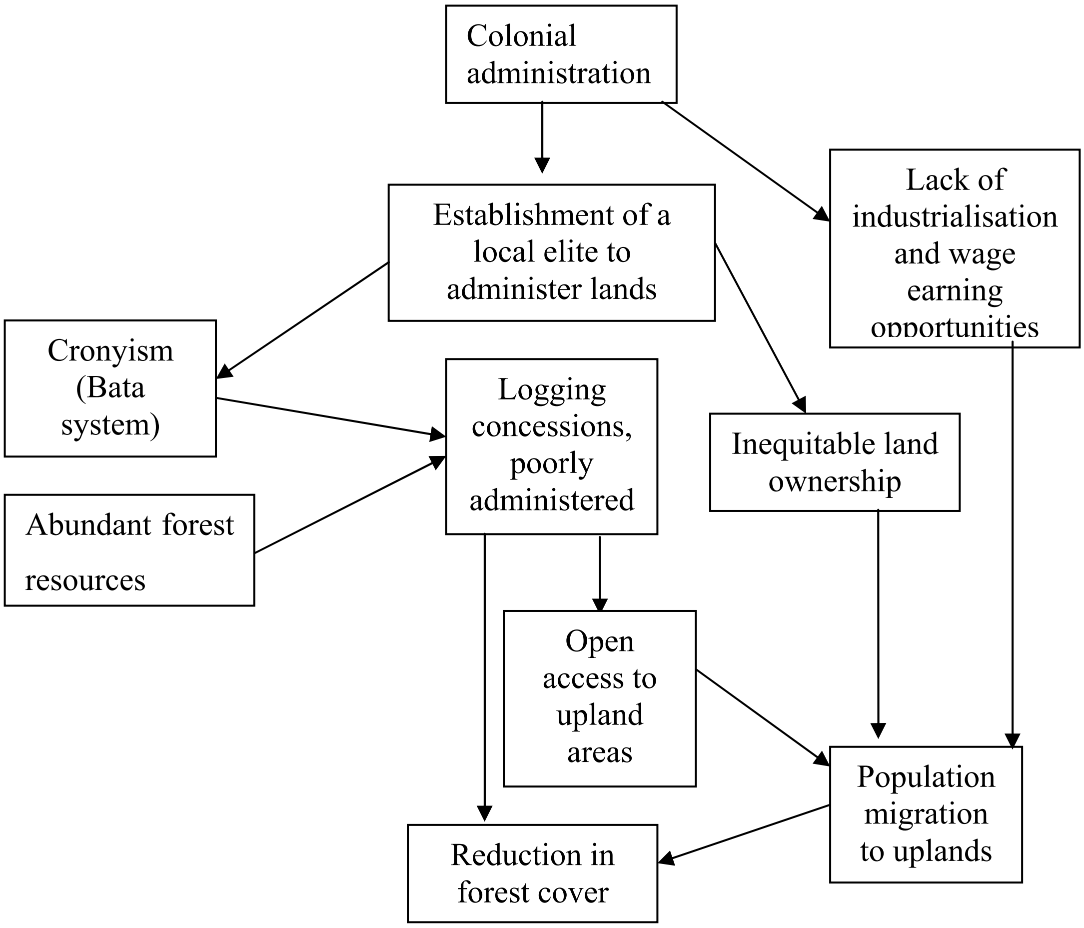

Figure 2.1: Political, economic and social processes that have led to reductions in forest cover in the Philippines

Source: Adapted from Ganapin (1986).

Those who operated logging concessions were able to operate freely, without risk of prosecution, and escaped most taxes. According to Ganapin (1986), those activities were emulated by the lower positions in the government bureaucracy until the entire system was corrupt. He pointed to the massive under-reporting of log exports during the 1970s and tax evasion as one example of this immunity from prosecution. He further described a study in Palawan that investigated the clearing of steep land for agriculture while large tracts of lowland farmlands were idle. He reported that the reason the lands were idle was because they were owned by absentee landholders, and that '…population pressure …was artificial, caused by the inequitable distribution of resources' (Ganapin 1986 p. 69). Likewise, Kummer and Sham (1994, p. 158) concluded:

> …the most important factors in deforestation from 1970 to 1980 were logging in 1970, and the spread of

> agriculture. Both the granting of concessions and the spread of primarily subsistence agriculture are the reflections of a development process which has concentrated resources in the hands of a small elite and left the majority of Filipinos in poverty.

Pressure from civil society in the Philippines together with pressure from international lending agencies and foreign governments led to the changes in the forestry industry. The scale, types of operations and control of forestry in the Philippines has changed dramatically in the last 30 years, from an industry dominated by a relatively small number of corporations with large land areas to control, to an industry that is led by community forestry. For the period from 1900 until the early 1990s the forestry sector in the Philippines was dominated by corporations which were granted Timber License Agreements (TLAs) by the national government. By the early 1970s these TLAs gave corporations the power to harvest and manage over one third of the Philippines 30 M ha land area, or two thirds of forest areas (Hyde et al. 1996, Pulhin 1998, de los Angeles 1999).

2.5 THE DEVELOPMENT OF COMMUNITY FORESTRY PROGRAMS IN THE PHILIPPINES

Pulhin (1998), following Rebugio and Chiong-Javier (1995), recognised three main periods in the development of community forestry in the Philippines. The first was the ‘pioneering’ period from 1971 to 1980. The second was the ‘integration and consolidation’ period from 1981 to 1989. The third period was termed the ‘expansion and institutionalisation’ period from 1990 to the present (Pulhin 1998, p. 2-3).

2.5.1 The Pioneering Period of Social Forestry Programs

In the 1970s, community forestry initiatives were begun in many parts of the world in response to concerns about links between deforestation and environmental disasters, along with concerns about poverty, the lack of social equity and justice, and the related rise in insurgency activities. The Kaingin Management and Land Settlement Regulations 1971, the Forest Occupancy Management Program 1974, Communal Tree Farming Program/ Program for Forest Ecosystem Management (PROFEM 1), and the Family Approach to Reforestation (FAR) Program 1979 are examples of early community forestry programs in the Philippines (Gerrits 1996, Pulhin 1998). Changes to regulations in 1975 introduced a provision that swidden farmers or kaingineros who had occupied their land prior to May 1975 could not be ejected from that land. Secure tenure for periods of between two and 25 years were issued to forest dwellers and 'squatters' under some of these programs, together with permits allowing kaingin farming. Communities and families were employed as labourers in reforestation projects, and forest dwellers and upland farmers were given new roles as the protectors of the forest against unauthorised timber gathering and kaingin farming (Guiang 2001a).

Another development in the late 1970s was the work of the academe and several NGOs to develop upland agricultural systems that would prevent or reverse upland deforestation, soil erosion and declining agricultural productivity (Guiang 2001a). These programs provided useful techniques for farming in upland areas. They also developed methods for working with upland communities, and methods for providing information about soil and water conservation in conjunction with information about improved upland agricultural techniques (Guiang 2001a).

2.5.2 The Integration and Consolidation Period of Social and Community Forestry

Widespread poverty in the Philippines, the growing social and environmental awareness of the Filipino middle class, together with pressure from other nations, and growing insurgency in parts of the Philippines, led to growing awareness about the inequities of forest land allocation and the distribution of benefits from forest resources (Guiang 2001a). President Marcos lifted martial law in 1981, the same year the Uplands Development Working Group (UDWG) was established to study the factors affecting the success of community forestry development programs. They and the Upland Development Program, funded by the Ford Foundation, were asked to design the Integrated Social Forestry Program (ISFP). With the ISFP started in 1982, the group had insufficient time to assess the workings of the previous programs and address all their deficiencies. They were however able to influence the ISFP in four areas (Gerrits 1996, p. 6), emphasising the:

1) importance of using biophysical and socioeconomic criteria in site selection;
2) importance of land tenure security as a major obstacle to development;
3) use of community organisations to facilitate development; and
4) need for agroforestry and soil conservation measures.

The ISFP became an entry point for foreign aid donors including the World Bank, the Ford

Foundation and the United States Agency for International Development (USAID) (Guiang 2001a). The Philippines revolution in 1986 (People Power 1) led to the expansion of the community forestry program and revision of the ISFP. The ISFP was revised in 1988 and again in 1989, following the reorganisation of the DENR to reflect pro-people, pro-environment and pro-social equity forest policies (Guiang 1996, Dove 1995, cited in Guiang 2001a). The 1987 constitution stipulates that natural resources can only be exploited and developed through joint ventures, co-management and co-production agreements between local communities and the government and private organisations. Of more than 200 Timber License Agreements (TLAs) that covered more than two thirds of forested Philippine land in 1976, all but 28 had been cancelled or had lapsed by 1996, and logging bans in residual and old growth forests were intensified (Hyde et al. 1996).

2.5.3 The Expansion and Institutionalisation Period of Community Forestry Programs

The Philippine Master Plan for Forestry was developed in 1990, supporting the beginning of the Forest Land Management Agreement program in 1991, and the Certificate of Ancestral Domain Claims in 1993 (Guiang 2001a). The development of the Master Forest Plan, supported by the Finnish Government, was also a means to attract funding for community forestry programs from the Asian Development Bank (ADB), the World Bank, the German Tropical Ecology Program (GTZ), USAID and other donors. The emphasis of community forestry programs shifted from their focus on cleared upland areas, to allow people to pursue claims and access resources in remaining forest areas, including areas for biodiversity conservation and watershed protection reservations. The community forestry programs have come to cover productive residual forests, existing plantations, old growth forests, watershed reservations, and biodiversity conservation areas. Buffer zone and multiple-use zones are now common elements of community forest management agreements (Guiang 2001a).

2.5.4 The Changing Culture of Forestry in the Philippines

The situation today is quite different to that in the 1970s when corporations still controlled forest areas through TLAs. Today community-based forest management agreements cover large areas of land, native forest logging is now restricted or totally banned in the 70 of the 77 provinces in the Philippines, and national reforestation programs are in place in an attempt to stabilise the natural and agricultural ecosystems of the Philippine upland areas (Guiang 2002). The community controlled forest areas are targeted to reach 9 M ha or approximately 58% of the Philippines' total forest land area by 2008, while Timber License Agreements covered only less than 1 M ha in the year 2000, and only 0.5 M ha are expected to be allocated to industrial tree plantations and other purposes (Pulhin 1998, Angeles 1999, de los Angeles 2000). Still, it is estimated that approximately 8.7 M ha of forestlands are considered de facto open access areas either because of undelineated boundaries for forest reserves, national parks and wildlife areas, or because there is no management instrument for the area (de los Angeles 1999). For the remaining 6.7 M ha of forest lands that are covered by management agreements specifying user rights, it is thought that many are lacking in terms of their management, with few following the 'best' practices that have been reported to be used in various pilot project areas (de los Angeles 1999).

Forestry in the Philippines has changed in the last 30 years from being dominated by commercial extraction of native timber by corporations to a situation where communities now have title over more than 5 M ha of forestland. The concept of community-based natural resource management has been central to the policies and programs of the DENR since 1996. The change in direction of forest management in the Philippines is in a situation where, as La Vina (1999, p. 7) concluded:

> At least from a policy perspective, the State has reversed its land classification policies and its bias for commercial utilisation in favour of recognising the positive role of indigenous and local communities in natural resource management. It should be noted, however, that this reversal did not come about automatically or out of pure good will on the part of the national government. Indeed, this paradigm shift resulted mainly from the untiring efforts by these communities and the nongovernmental organisations that supported them.'

The efforts to promote and maintain community and social forestry programs have not been without challenges. The changes in the manner in which natural resources are managed in the Philippines have necessitated changes for many of the stakeholders involved. These changes include the devolution of powers to Local Government Units, continued efforts to institute agrarian reform, together with reform of the DENR and other government agencies associated with land management. The organizational reforms are attempting to re-orientate the culture of the organizations from one that was primarily a police service for natural resources, to a new role as community development facilitators. The challenges posed by the change to community-based forest management in the Philippines are examined in detail in Chapter 6.

2.6 DEMOGRAPHIC CHARACTERISTICS AND POLITICAL ADMINISTRATION OF LEYTE PROVINCE

Leyte Island is situated in the middle of the Philippine archipelago in the Eastern Visayas region. The island is split into two provinces including Leyte, and Southern Leyte. The Leyte province is a part of the National Administrative Zone Region 8, centred in Tacloban. This region also includes the island of Samar that lies to the north-east of Leyte island. Region 8 consists of six provinces: Leyte, Biliran, Southern Leyte, Samar, Eastern Samar and Northern Samar. It has four cities (namely Tacloban, the regional capital, Ormoc, Calbayog and Maasin), 139 municipalities, and 4,390 barangays (Table 2.2). San Juanico Bridge, the longest bridge in Southeast Asia connects the two main islands of Leyte and Samar at a point near to Tacloban (Figure 2.2).

Table 2.2. Selected demographic details about region VIII and Leyte

Demographic statistic		Region 8	Leyte	Southern Leyte
No. of municipalities		139	41	18
No. of barangays		4,390	1,641	500
Total population (May 2000 census)		3,610,355	1,592,335	360,160
Population density (persons per square km)		168.5	278.7	207.6
No of households (May 2000 census)		715,025	332,527	72,894
Average household size		5	4.9	4.9
Labour force participation rate (Apr 2002)		77	77	68
Unemployment rate (all)		10.20%	9.70%	15.10%
	Women	14.20%	13.60%	22.20%
	Men	7.60%	7.30%	11.00%
Average annual family income (Pesos) (2000)		91,520	106,567	85,623
Annual per capita poverty thresholds (2000)		10,783		
	Urban	12,011		
	Rural	10,287		
Poverty incidence of families, 2000		43.60%		
	Urban	27.10%		
	Rural	50%		

Source: NSCB (2003)

The population of Region 8 according to the May 1, 2000 census was 3.6 M. The population grew by 1.5 % annually during the period 1995-2000. There are about 168 persons per square kilometre in the region, and 279 people per square kilometre in Leyte Province. By the year 2005, its population is projected to reach 4.1 M. The population of the Philippines is 75.33 M, with a growth rate of 2.35% (NSCB 2003). On Leyte Island the population is 1.93 M people, on Samar Island 1.52 M people, and on Biliran Island 140,000 people (Table 2.2).

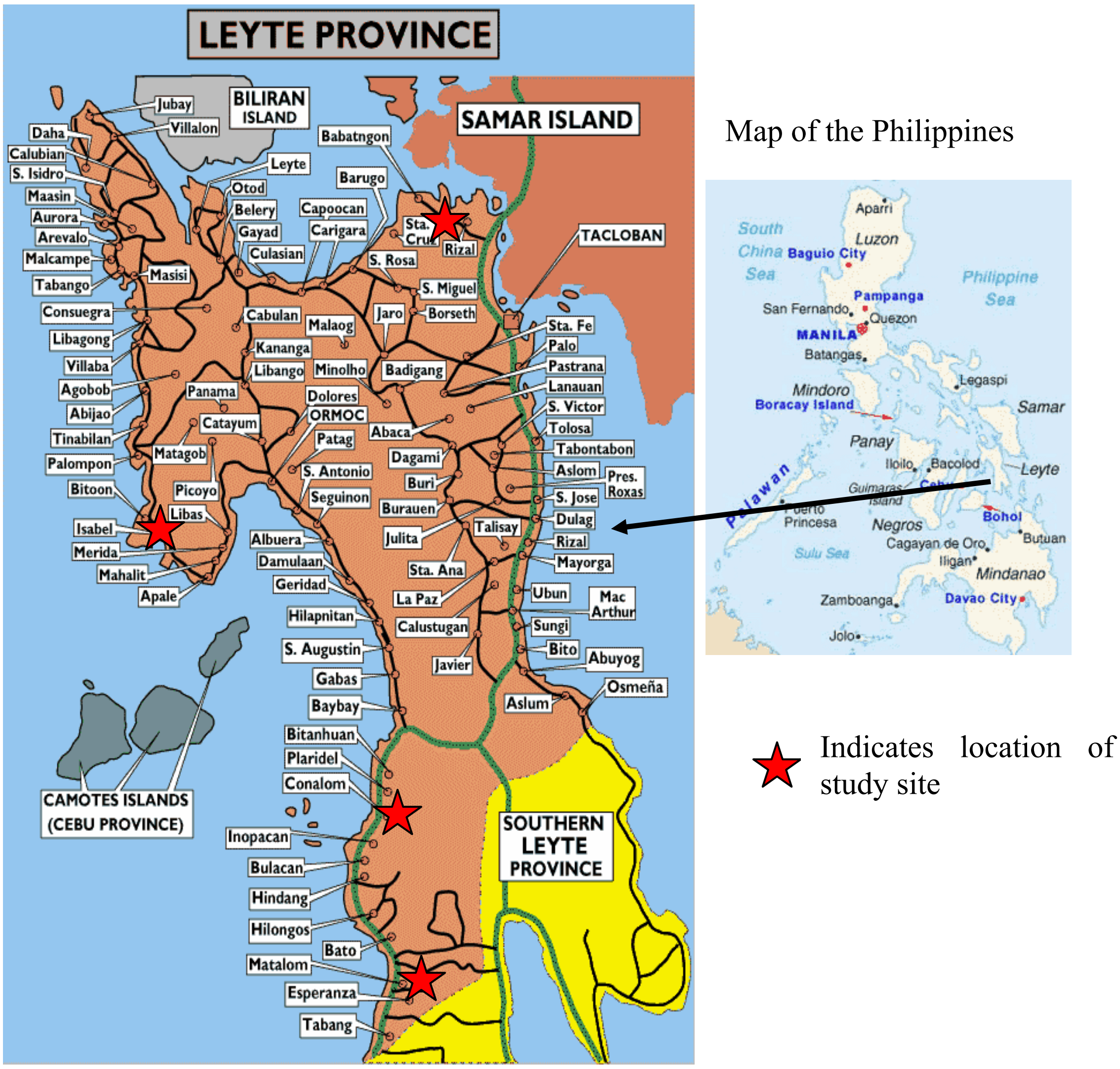

Figure 2.2: Map of Leyte Province, Philippines

Source: http://users.belgacom.net/baybay/leytemap.htm

Poverty is an acute problem in the province of Leyte, in rural areas in particular. In the year 2000, 50% of families in rural areas were below the poverty threshold of P10,287 per capita per year (Table 2.2) (NSCB 2003). This figure is approximately equal to US$200 with an exchange rate of approximately P50≈US$1.

The Gini coefficient of income, which measures the equality of income distribution, was 0.487 for the Philippines in 1997 (Reyes 2000). A Gini coefficient of zero shows perfectly equal income distribution and of one shows perfect inequality. The Gini coefficient for the per capita income in the Philippines fell slowly for the period 1961 to 1988 from 0.465 to 0.445, but has actually increased since that time, implying that income inequality is growing in the Philippines.

2.6.1 Cultural Groups and Education Levels on Leyte

The island of Leyte is divided down the centre by a mountain range that bisects the island from north to south. The people speak two local dialects: Waray on the eastern side of Leyte (and throughout Samar island), while the Cebuano dialect predominates in western Leyte, Southern Leyte and in Biliran province to the north of Leyte. English and Filipino (Tagalog) are also commonly used throughout Leyte Island.

The majority of the household population in Leyte classified themselves as Binisaya/Bisaya (39.94 %) or Waray (37.62 %). Other ethnic groups included Cebuano (20.25 %), Tagalog (0.34 %), and Kankanai/Kankaney/Kankanaey (0.11 %). In terms of education, of those five years old and over, more than half of the population completed or attended elementary education (51.67 %); 22.74 % are in or have completed high school; 7.69 % are college undergraduates; and 3.56 % are academic degree holders. Males dominated the elementary (52.99 %) and post-secondary levels (50.93 %), while the other categories are dominated by females (NSCB 2003).

2.7 LAND CLASSIFICATION AND LAND USE ON LEYTE ISLAND

The Philippines uses a national land classification system to aid natural resources management and planning. The main two categories are ‘Alienable and disposable lands’ - land that is available for titling and private ownership - and ‘Forest land’ - land that is usually prescribed timber production, and is generally under public management either through the DENR or sometimes community organisations (Table 2.3).

The great majority of the 35% of the area in Leyte Island classified as forest land is on steep slopes of the central mountain range. Much of this area is, in fact, cleared farming land. Apart from the mounting pressure from international lending and aid agencies and parts of civil society within the Philippines, one of the triggers for the total ban on logging from natural forests in the Philippines was the Ormoc disaster on 5 November 1991. On that day a flash flood swept through the city of Ormoc in the early hours of the morning and carried approximately 10,000 people out into the ocean. Many were drowned as a consequence. In December 2003 a mudslide destroyed approximately 220 houses and killed 100 people in the southern parts of Leyte Island. In both cases the disasters were triggered by heavy rainfall in mountainous areas that have been inappropriately cleared for agriculture. In the case of the 1991 Ormoc disaster, it has been hypothesised that the heavy rain was dammed by a collection of logs left from illegal logging activities in the upland areas behind the coastal city. Water volumes and pressure built-up over many hours until the log dam burst, releasing many millions of litres of water in the disastrous flash flood. Recent studies that have used Geographic Information Systems (GIS) to examine the potential for landslides have concluded that the potential for a repeat of the events that occurred in 1991 in Ormoc is 'not remote' with 'no significant intervention being done so far to address the above causes of the landslide' (Godilano 2004, p. 18)

Table 2.3. Land areas in Region 8 and Leyte by classification types

Land classification	Region 8	Leyte	Southern Leyte
Total Land Area (ha)	2,143,169	626,826	173,480
Alienable and Disposable Land (%)	48	65	73
Total Forest Land (%)	52	35	27
Breakdown of forest land areas:			
Classified Forest Land (%)	50	31	16
Timberland (%)	48	28	6
Unclassified Forest Land (%)	2	3	11
Forest Reserves (%)	2	3	10
National Parks (%)	0	1	-
Military Reservation (%)	0	0	-
Civil Reservation (%)	0	0	-
Fishpond Development (%)	0	0	-

Source: National Mapping and Resources Information Authority (2003).

Figure 2.3. Progressive ‘erosion’ of the forest margins through expansion of cropping activities in the uplands to the west of Ormoc City.

The areas of forest land in Leyte are progressively declining like those of the other parts of the Philippines, under pressure from illegal logging activities and the gradual expansion of cropping activities (de los Angeles 1999, Guiang 2001c). An example of the process of expanding agricultural activity removing forest cover is illustrated in Figure 2.3. Forest lands in the majority of Leyte lack boundary markers, management plans and adequate funds for management that could potentially protect them from clearing. The recent landslide-disaster in Southern Leyte is a reminder of the urgent need to revegetate areas of Leyte and provide them with effective management plans, activities that could potentially lead to reforestation of critical areas of the watersheds in the mountain areas.

2.8 CLIMATIC, ECONOMIC AND AGRICULTURAL CHARACTERISTICS OF LEYTE PROVINCE

There are two broad climatic types in the region: Type II (No dry season with a pronounced maximum rainfall from January to November), and Type IV (Rainfall more or less evenly distributed all year round) (NSCB 2003). The annual precipitation level is up to 4,000mm in the mountainous areas of the island of Leyte. Typhoons can affect Leyte Island, although they are not as frequent in Leyte as they are in the neighbouring island of Samar, which lies adjacent to the Pacific Ocean. The last severe typhoon to affect Leyte was more than 10 years ago. The high rainfall and relatively uniform distribution throughout the year means that it is possible to produce two crops of rice per year in many parts of Leyte Island that have access to irrigation.

In the past Leyte's economy has been mainly based on agriculture but is now slowly transforming into an industrial one. In 2000 the Industry sector contributed 37.2 % of the region's gross domestic product. The Service sector accounted for 33.3 % while the Agriculture, Fishery and Forestry sector made-up the remaining 29.6 % (NSCB 2003). The main agricultural crops are coconut, palay, abaca, sugarcane, cassava, banana and sweet potato (Table 2.4, Figure 2.4). Major Industries and commercial establishments in Leyte include the Philippine Associated Smelting and Refinery (PASAR), Inc., Philippine Phosphate (PHILPHOS), Inc., the New Leyte Edible Oil Manufacturing Corporation and the Hilongos Development Corporation (FILMAG Holdings) Inc. Major Export Products include copper cathodes, phosphatic fertilizers, raw and refined sugar and molasses, crude coconut oil and copra cake abaca fiber and sinamay cloth, prawns, and bentonite, used to produce natural-foundry grades and drilling mud (NSCB 2003).

Table 2.4. Main commercial crops grown in Leyte

Crop type	Region 8	Leyte	Southern Leyte
Patay production (metric tonnes)	99,959	59,031	5,226
Coconut production (metric tonnes)	154,883	57,013	8,143
Sugarcane production (metric tonnes)	110,462	110,462	-
Abaca fibre production (metric tonnes)	8,707	2,507	4,271

Source: NSCB 2003. Figures are in metric tonnes for the 3rd quarter of 2002

Figure 2.4. Coastal rice paddies backed by hillside farms of coconut palms, typical of the landscape of the western shore of Leyte Island

2.9 SUMMARY

Forest resources in the Philippines are presently degraded and are not fulfilling their required functions of providing ecosystem services or timber products. These ecosystems services include the stabilisation of soils in watersheds critical for the provision of water for household use and irrigation as well as habitat for the unique and varied flora and fauna of the Philippines. The degradation of forest resources has been linked by previous research to the lack of economic development in the Philippines, the high population density, and the legacy of colonial administrations in the country, including highly concentrated ownership of productive assets.

In the period until the 1990s, forest resources were unsustainably utilised by corporations with sanction from the State, and the operations of these corporations were closely followed by poverty stricken households that were forced through circumstance to move into logged over forest lands. Despite the official bans and the punitive punishments for using forest lands for shifting agriculture, due to lack of resources and the sheer pressure of poverty government agencies charged with regulating the use of forest land areas were never able to adequately protect forests from degradation and clearing. The farming practices of these households in the fragile upland areas have resulted in the conversion of large areas from forestland to grassland. Lack of capital for inputs into agricultural activities to maintain soil fertility and a lack of off-farm employment opportunities has continued to place pressure on remaining forest areas to provide land resources for cropping activities.

Population growth rates in the nation have not fallen, economic growth is low and wealth distribution and land ownership are becoming even more concentrated. Philippine governments have come under pressure from civil society and international agencies to reform the forestry sector and have responded by institutionalising community-based forest management programs. These programs have sought to reverse the degradation of forest lands and the problems of poverty in rural areas in the Philippines through granting the management of forest areas to communities. These programs have made some progress in terms of the area they cover but, with the communities unaccustomed to managing projects and lacking investment capital, they require a great deal of support to successfully achieve their environmental and social goals.

Chapter 3

THE USE OF FARMER AND HOUSEHOLD TYPOLOGIES TO ASSIST THE DESIGN AND DELIVERY OF NATURAL RESOURCE MANAGEMENT PROGRAMS: AN INTRODUCTION

In the field of natural and rural resource management the focus of typology development has been the description and exploration of relationships between socioeconomic factors and behaviour of rural households. In this chapter, the theories underlying the development of typologies and understanding of household decision-making in relation to small-scale forestry are reviewed. A variety of approaches have been used to create landholder typologies and it is important to understand the rationale behind them, their similarities and differences, and the advantages and disadvantages of each for addressing the research questions posed in this thesis. In the first section, the rationale for developing landholder typologies is discussed. In the second section, the various criteria that have been used to create typologies are examined. In the third section the methods of studies that have developed typologies of farms, farmers and rural households are reviewed. In the fourth section the methods that can be used to validate typologies are examined, before theories describing the factors influencing land management decisions are reviewed in the fifth and final section.

3.1 THE RATIONALE FOR DEVELOPING LANDHOLDER TYPOLOGIES

National governments and others interested in natural resource management are promoting sustainable natural resource management practices in an effort to achieve objectives in relation to environmental, social and economic development. Researchers and extension personnel have argued that decision-makers and extension providers need to understand the variety of socioeconomic circumstances and value systems of the various sectors in the community, how these differences affect land management attitudes and behaviour, and how the differences lead to variation in the impacts of public policies and programs across the community (Chamala 1980, Byron and Boutland 1987, Chamala *et al.* 1987, Raintree 1991, Barr 1996, Emtage 1996, van den Ban and Hawkins 1996, Howden *et al.* 1998, Landais 1998, Specht and Emtage 1998, Emtage and Specht 1998, Guerin 1999, Fulton and Race 2000, Howden and Vanclay 2000, Emtage et al. 2001, Dorward 2002, Johnson 2002, Boon et al. 2004). With the increasing recognition of the diversity of farms within regions and nations, and the implications this has for natural resource management (NRM) outcomes, those interested in NRM have experimented with the use of typologies and systems analysis methods to both explain and explore the socioeconomic factors that affect natural resources management.

Typologies have been routinely used in social sciences to classify, analyse and describe social phenomena. The use of taxonomies in the biological sciences is also well established, with typologies used for describing and analysing variations in biophysical elements and resources ranging from air masses, to climates and soils. While the potential for using typologies in research to assist natural and rural development and resource management programs was discussed widely in the 1980s and early 1990s, the application and reporting of such studies was rare until the mid 1990s. Classification schemes of varying degrees of complexity have been used from time to time to analyse and describe diversity in agricultural enterprises and rural households in the United States since the 1940s (Johnson 2002). Early applications of typologies in the study of farming systems in the 1980s in France examined intensive production systems for to aid the diagnosis of deficiencies and recommendation technical improvements (Landais 1998, Perret and Kirsten 2000). The number of studies that are defining farmer and household typologies in respect to their natural resource ownership, attitudes and practices has increased greatly over the past five years, with studies now completed across Europe, North America, South America, Africa, Asia and Australia.

‘Typology’ is defined in the Australian Concise Oxford Dictionary as; ‘the study and interpretation of types’. A ‘Type’ is defined as; ‘a class of things or persons having common characteristics’. Central to a typology, therefore, is the design and application of a classification scheme. In relation to rural sociology, a typology is defined by Jary and Jary (1995, p. 563) as ‘Any classification conceptual scheme. It may or may not be exhaustive within its’ empirical frame of reference. The role and utility of any typology is relative to the theoretical or practical perspective within which it is situated’.

In assisting natural and rural resource management programs, typologies are commonly used as a means to aid description of the variation in the socioeconomic characteristics of farms and rural households, and variations their natural resources management behaviour. The usefulness of the typology is dependent on the information available to support it. Landais (1998) described two types of information needed to support typologies of farmers, these being descriptive and prescriptive references. Descriptive references are those used to describe the socioeconomic characteristics of the farmers and their landholdings, while prescriptive references are those used to help optimise farms' operations.

Typologies can help to target extension programs, communication strategies and strategic plans for the development of natural resources and conservation planning at a local, regional or national scale. Typologies can aid understanding of how programs will affect landholders in differing social and economic circumstances, help to match the needs of natural resource suppliers to processors, and assist in understanding potential natural resource industry structures (Chamala 1980, Byron and Boutland 1987, 1987, Raintree 1991, Kaine and Lee 1994, Emtage 1995, Rogers 1995, van den Ban and Hawkins 1996, Howden et al. 1998, Emtage and Specht 1998, Guerin 1999, Race 1999, Fulton and Race 2000, Howden and Vanclay 2000, Perret and Kirsten 2000, Emtage et al. 2001, Busck 2002, Johnson 2002, Boon et al. 2004). More recent applications of typologies have used them to assist the analysis of business, climate and famine risks for small farmers (Bourgeois 1999, Valdivia et al. 2000, Dorward 2002).

According to Landais (1998), typologies of farmers are constructed to aid those designing and administering farm development programs to fulfil their two basic functions. These functions are to analyse a farms' functioning, and to provide recommendations on techno-economic matters that may help to optimise the farms operations (Landais 1998, p. 506). It is generally accepted that the land management behaviour of farmers and rural households is not motivated purely by economic considerations such as the maximising of productivity of farming enterprises (see, for example, Phillips and Gray 1995, Vanclay and Lawrence 1995, Emtage et al. 2001, Busck 2002). Rural landholders are not necessarily farmers at all, particularly in developed countries, and typologies have application in NRM and sustainable livelihood studies that may not include farming. Given the diversity of objectives for land management of rural land managers, the concept of Landais (1998) could be rephrased as 'typologies are constructed to aid the analysis and description of a systems functioning, and to enable recommendations to be made of means to optimise this system for some purpose'. The 'system' may be the functioning of a biodiversity conservation system, or the maintenance of landscape amenity. The selection of the system studied and definition of the purpose of the system optimisation is a matter decided by the researchers and their sponsors. The utility of the typology is critically dependent on the selection of the criteria used to define it.

3.2 CRITERIA USED TO CREATE TYPOLOGIES OF FARMS, FARMERS AND RURAL HOUSEHOLDS

Various approaches to the development of typologies have been tried and discussed by different authors. Whatmore (1994) defined three approaches to the development of typologies in rural sociology. The first is a taxonomic or 'positivist' approach, which defines types based on measurement of empirical data. The second approach is a 'relational' approach, based on theoretical assumptions about the structural relations between the biophysical environment, social institutions and individuals or households. The third approach is the 'experiential' approach, identifying groups by interpreting the 'peoples reasoning about the meaningfulness of various practices' (cited in Busck 2002, p. 234).

Another perspective on the types of typologies is offered by Perret and Kirsten (2000, p.4-5). They describe two types of typologies, 'structural typologies' that examine the factors of production and how they are organised, and 'functional typologies', which are based on analysis of the decisions of farmers in their social and biophysical context. Structural typologies are analogous to Whatmore's relational approach, while functional typologies are more similar to the positivist and experiential approaches. Another way of classifying typology studies, which is also related to the classification system applied by them, is to determine whether the classification system is deductive or inductive. Inductive systems are based on the application of analysis techniques (such as cluster analyses) to identify patterns in the data relevant to the phenomena of interest without a priori classification scheme. Deductive systems are those where a classification scheme is defined prior to the examination of the data based on past experience or theory.

The majority of studies reviewed for this thesis used classification criteria that were selected on the basis of theoretical understanding of the phenomena of interest and analysis of the findings of previous research. In most of these studies the methods used are quantitative, where the values of classifying criteria are used as input into factor analysis or cluster analysis procedures, and the analyst chooses the appropriate level of differentiation between types to define the boundaries of the types in the typology. These are generally positivist approaches in terms of the classification of Whatmore (1994).

Studies that have used qualitative methods in their classification systems include wealth ranking studies, farming styles studies, and the use of constructed types. In the studies using participatory wealth or well-being ranking methods, the choice of criteria used to create a typology is made as a result of discussions between the researchers and those being 'researched'. Those that are being 'researched' identify the important factors that determine differences within a population to use as criteria in developing typologies. In some cases key informants are asked to classify the other members of the community on the basis of the criteria specified. Advantages of this approach are that the local context of the research question is considered, and the opinions of those who are being researched are sometimes used to define the purpose of the research. Another advantage is that considerable resources can be saved by reducing the need for individual household surveys and subsequent statistical analyses to provide the information to support the use of the typology. These studies correspond to the 'experiential' approach described by Whatmore (1994).

The use of expert opinion to define types has been used by various researchers including Landais (1998) and Howden and Vanclay (1998). Landais (1998) and various French researchers have based their typologies on the analysis of the patterns of responses in quantitative data. In his paper, Landais described a technique that uses experts to define *a priori* the types in a typology through the definition of the values of between five and ten discriminating variables or criteria. Detailed on-farm surveys are than used to gather data about the farms and farmers of interest, and farms are allocated to types according to computed indices of their similarity to the 'constructed' types. The critical point, according to Landais (1998), is that the theoretical underpinning of the research is accurate in terms of enabling the prediction of farmers' strategic behaviour. The criteria used in these studies broadly include the enterprise type (intensity and management); the family objectives and history; the means of production; and indicators of techno-economic results. Studies that have defined types *a priori* are examples of 'relational' typologies as defined by Whatmore (1994), i.e. those that are based on theoretical assumptions about the relationships between factors affecting farm decisions. Howden and Vanclay (2000) sought to ask farmers to define and describe themselves, but in the end used expert interpretation of the patterns within these definitions and descriptions.

3.3 THEORIES AND METHODS USED TO CREATE TYPOLOGIES OF RURAL HOUSEHOLDS

The development of a typology of households requires a theoretical basis to define the relationships between factors thought to influence their behaviour. This theoretical understanding of the phenomena of interest is frequently used to determine the criteria used to define the typology and also to guide the collection of descriptive and prescriptive data that is analysed to support the typology. Obviously the description of a typology of farms based on a single criterion, such as land size, is of little use if this cannot be related to other differences between the types, including, for example, the level and sources of income to the farmer, differences in farming activities, family structure, communication behaviour, land management objectives and more. Researchers who have developed typologies have worked from a number of theoretical perspectives. The theories that have been used are discussed in the following section.

3.3.1 Theories Used to Guide the Development of Typologies

The theoretical understanding about the phenomena of interest and number and breadth of past studies on these phenomena strongly influence the way that a typology is constructed and reported. A variety of theories have been used to develop typologies of farmers and rural households. Some examples include:

- Farming styles theory;
- Sustainable livelihood theory;
- Farming context theory; and
- Market structure theory.

There are a number of common elements in each of these theories. They all strive to account for the behaviour of people or households, and each considers the behaviour to a result of the interaction between socio-cultural, economic, institutional, biophysical and personal factors. As mentioned above, many researchers draw on a variety of theories and methods to develop typologies of rural households and farmers. Each of the above theories is briefly described in the following sections.

3.3.2 Farming Styles Theory in Relation to the Development of Typologies

Farming style theories were developed by van der Ploeg and others in Europe. They basically state that '…within a farming community there is a discrete set of styles (or strategies of farming) which farmers are acutely aware of, and from which they actively choose a specific strategy to guide their own management' (Vanclay et al. 1998, p. 86). Howden and Vanclay (2000, p. 297) cited van der Ploeg (1993, p. 241) as stating:

> Farming styles refers to a cultural repertoire, a composite of normative and strategic ideas about how farming should be done. A style involves a specific way of organising the farming enterprise: farmer practice and development are shaped by cultural repertoire, which are in turn tested, affirmed and if necessary adjusted through practice.

The methodologies used to create typologies of farmers and rural households in studies based on farming style theories emphasise the importance of the farmer as an individual and the social dimensions of land management decision making. They frequently place greater emphasis on qualitative methods rather than multivariate statistical techniques to identify patterns. In order to create a typology these researchers seek '…combinations of observable agricultural practices within agricultural production and farmers' conceptions about how farming ought to be arranged.' (Bursck 2002, p. 234). Vanclay et al. (1998) asked farmers to articulate the styles of farmers they knew of, and then used a panel of extension experts to define a typology from the various descriptions supplied. Busck (2002) used information from case studies of individual farms, combining semi-structured interviews with farmers about their management objectives with assessment of their behaviour to devise a typology.

3.3.3 Sustainable Livelihoods Theories in Relation to the Development of Typologies

Sustainable livelihood theories were devised largely to address rural development issues in developing countries, and take a broader view of households and the context in which they act than is the case of studies based around farming styles theories. These theories are centred around the household rather than the farm, with explicit recognition of the potential for rural households to earn income from any source, including those that are not based on utilising natural resources (Figure 3.1). Sustainable livelihood (SL) approaches involve multidisciplinary studies and description of the diversity in the community, emphasizing the importance of using locally relevant criteria. They seek to address the diversity of the causes of poverty, plus the variety of opportunities for, and opinions of, the poor (Farrington 2001).

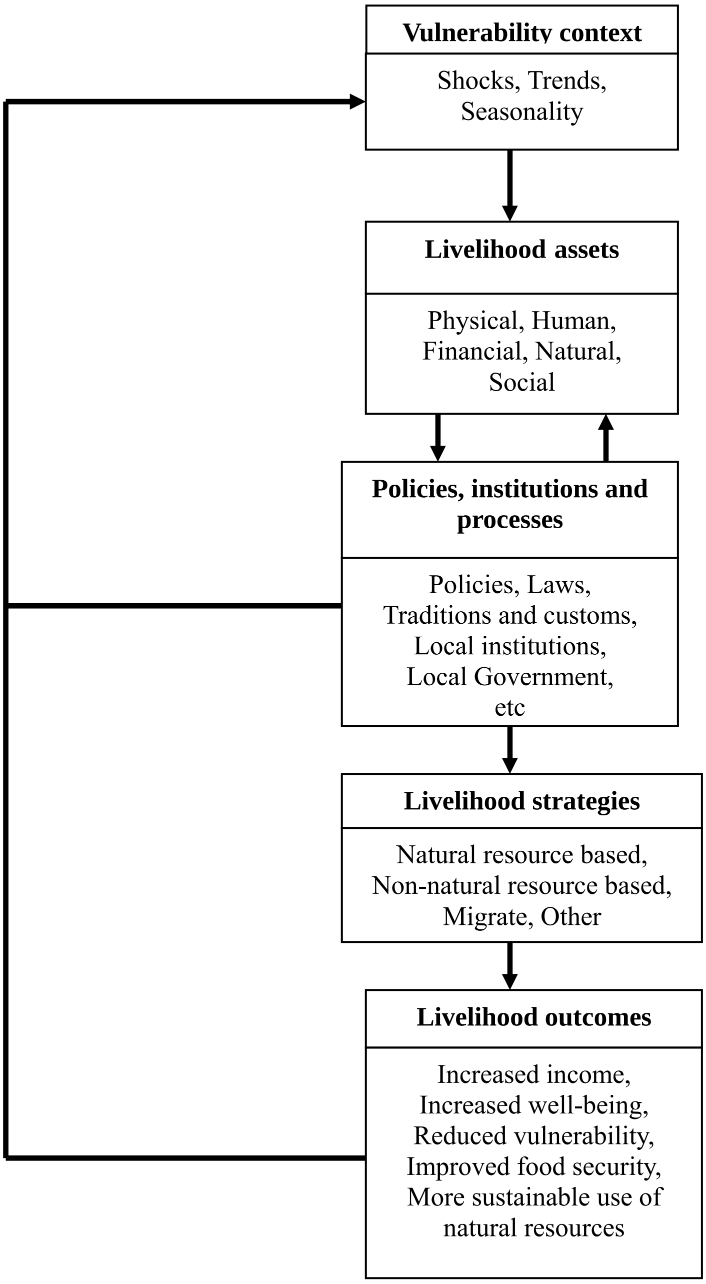

Figure 3.1. Representation of the relationships between resources, policies, livelihood and the environment in sustainable livelihoods theory (adapted from Dorward 2002)

Studies that have used the sustainable livelihoods approach include those of Belsky (1984), Bourgeois (1999), Perret and Kirsten (2000) and Dorward (2002). Similar to researchers using farming style theories to guide their work, the researchers using sustainable livelihood theories recognise the importance of the household members as actors who decide the way they strategise the use of their resources to provide their livelihood. The household is viewed as the decision-making hub, taking in and processing information about the resources available to the household, the objectives of the household, personal and socio-cultural views about the value and status of certain activities, and the rules and norms of institutions that govern the use of the resources available to the household.

The outcome of sustainable livelihoods research is designed to improve the livelihoods of poor households by improving their levels of well-being, food security, cash income, and the biophysical environment. Some studies have been largely qualitative (e.g. Belsky 1984), and others quantitative (e.g. Bourgeois 1999, Dorward 2002), or a mix of the two (e.g. Perret and Kirsten 2000). These researchers have not always sought theoretical grounds on which to base their decisions on the appropriate criteria to classify households, nor do they rely entirely on self-assessment by community members. Instead they try to incorporate the findings of previous studies that have applied farm systems analysis, poverty analysis and sociological research, and balance these with input from members of the community involved in the research.

3.3.4 Farming context theory in Relation to the Development of Typologies

Only one study was found that used farming contexts as a basis for the study, namely that of Kaine and Lee (1994). The concept of ‘farming contexts’ is drawn from the work of Crouch (1981) (cited by Kaine and Lee 1994). It is taken to mean the ‘resources, practices and technologies currently used by a farmer in production and the key attributes of the farmer such as his or her business and farming aspirations and objectives’ (Kaine and Lee 1994, p. 2). Again it is apparent that farming context theories hold that behaviour arrises from the combination of personal, social, biophysical and economic factors. The emphasis in this case, however, is more on examining the differences in farming practices within the same types of agricultural enterprises e.g. dairying or intensive cropping. The researchers examined the possible evolution of the enterprises given the present resources, practices and objectives of the farm household, stressing that the adoption of new practices are interrelated. That is, these researchers emphasise that in order to accrue advantages from adopting a particular practice, other practices must already be in operation or taken up at the same time. This study appears to share some common elements with the approach used by Landais (1998) and others in France, in that the French studies appear to have been undertaken in regions dominated by a single type of farm enterprise, and they both are interested in the dynamic nature of farming operations.

Kaine and Lee (1994) recognised the similarities between their approach and that of market segmentation and the potential utility of such an approach. They stated that:

> …if farms are classified into groups on the basis of differences in production ‘context’, then each group could be interpreted as representing a different ‘segment’ in the ‘market’ for agricultural innovations and extension services...In short, we believe that by classifying farmers into groups or segments extension services and farm advisory services may be able to identify those groups of farmers that are more likely and less likely to adopt an innovation. Given the set of set of practices that are functionally related to a particular innovation, the mixture of practices that have been adopted will differ across segments. Armed with this information, extension organisations may design programs, based around different ‘packages’ of practices and techniques, which are tailored to the specific needs of segments (Kaine and Lee 1994, p. 55).

3.3.5 Market Structure Theory

Several studies which have developed typologies of rural landholders have used methodologies adapted from market structure theory to guide their research, including those of Barr 1996, Emtage and Specht 1998 and Emtage et al. 2001. In marketing studies, attitudes to certain products and the intensity and intended function of their use are commonly applied as the criteria for the definition of market segments. Market segments are sections of the potential market for a product which are sufficiently different from each other to allow the development of products and marketing strategies tailored to suit them (Dillon et al. 1990). Market segment analyses commonly use typologies to present a picture of the diversity of consumers for a particular product. Marketing typologies are used to describe the variation in intensity of use of a product, the variation in the benefits sought from a product and constraints to the use of the product. The typology is supported by information about the demographic profile of the various types and other information, such as the media usage patterns of the types, which can help to design marketing strategies for the product.

Barr (1996) compared the findings of more than 20 studies of the factors influencing the use of perennial pasture species in south-east Australia. Barr tried to discover common features in the descriptions of farms and farmers in the studies he reviewed, aiming to describe the ‘market’ for perennial pastures in the region by defining a typology. He noted the repetition of patterns of the types described in the studies, in the combination of socioeconomic characteristics of farms and farming households, their attitudes and their farming practices.

These characteristics included the rates of adoption of certain farming practices, household needs and objectives, and households' attitudes to farming. In their studies of farm forestry in Australia, Emtage and others used farmers ratings of importance for various potential reasons for and constraints to tree planting and management as the criteria for developing a typology of farmers in relation to their tree planting management (Emtage 1995, Emtage and Specht 1998, Emtage et al. 2001). In this case the 'product' was trees used on rural lands for a variety of purposes. The surveys assessed the importance attached by farmers to the various functions that trees can provide on farms, and the farmers perceptions of the importance of various constraints to their use.

3.4 METHODS USED TO VALIDATE TYPOLOGIES

Before assessing whether a typology will assist the design and delivery of tree planting and management development programs, a typology must be validated. Typologies of farmers and rural households can be validated in a number of ways. These include analysis of the consistency of the typology with theoretical concepts about the phenomena of interest, assessment of the potential to apply the typology to aid the objectives of the research, and testing of stability of the typology through comparison of the results of different analytical procedures. These three means of assessing typologies will be examined in the following section.

3.4.1 The Predictive Validity of Typologies

One means of validating the results of a cluster analysis and subsequent typology is to assess whether the types defined on the basis of one or more criteria also differ in terms of other criteria that are known, through theory and past research, to be related to differences in the classifying criteria (Hair et al. 1995). Thus the validity of a typology can be determined in part through assessment of the characteristics of the members of the various types, that is, those characteristics not used as criteria to define the types. For example, if types are defined on the basis of their objectives for managing trees on their land, it can be assumed that the types will differ from each other in terms of these objectives. If subsequent testing of the characteristics of the types reveals that they also differ in terms demographic and socioeconomic factors that are known to be related to differences in farmers objectives for managing trees, such as the characteristics of their production enterprises, or level of reliance on farming for their income, then it can be concluded that the typology satisfies the test of predictive validity. The construction of typologies can also potentially help to develop and refine theories, through illustrating the way that the socioeconomic, biophysical and personal factors affecting natural and rural resources management behaviour combine to result in differing behaviour.

3.4.2 Assessing the Practical Utility of Typologies

The utility of typologies to aid natural resources management extension programs is another means that can be used to judge whether a typology is valid. The practical utility of a typology is dependent on whether the typology offers the opportunity to target programs and communications to specific types of the typology. In designing a methodology to classify farmers it is important to choose a system that will be communicable to extension workers and development program designers, will be useful in aiding the design and implementation of development programs, and preferably can be replicated in other regions without the need for extensive fieldwork.

One objective for researchers developing typologies is to maximise the within-type homogeneity whilst also maximising the differences between the types (Hair et al. 1995). This criterion for assessing a typology has implications for the number of types that are defined and described. As the number of types defined increases, the differences within types decreases, as do the differences between types. The other dimension to the question of the utility of a typology is the ability of those interpreting and using the typology to conceptualise the unique nature of each type and means to communicate with and affect the behaviour of those within each type. Once the number of types in a typology increases beyond ten or so groups these factors becomes increasingly difficult to conceptualise and communicate to users of the research. Thus the number of types defined in a typology is a trade-off between the objective of describing unique types, and being able to communicate and operationalise the findings of the research.

Another practical factor that limits the number of types described in a typology is the need to assess differences between types using statistical tests. As the number of types increase, the number of members in each will decrease. This reduces the replicates for each type, and unless the sample used to create the typology is very large, the reduced number of members in each type can greatly restrict the statistical tests that can be used to test for differences between types.

3.4.3 Determining the Stability of a Typology

A fundamental objective for researchers who use typologies in their research is to define and describe the ‘natural’ patterns of variation that exist within a community. One potential problem for researchers using cluster analyses as a method for defining a typology is the variation in results that occur between the various methods of cluster analysis (Hair et al. 1995, SPSS 2000). There are two ways of addressing this issue. The first is to apply a number of different types of cluster analysis procedures to the data and compare the results of each through comparing the characteristics of the types that are formed. The second means to determine the validity or stability of the groups formed through cluster analysis is to split the sample in two on a random or stratified basis, depending on whether there are theoretical reasons to suggest that there will be differences within the sample. The researcher can then undertake two runs of the cluster analysis procedure on the two sub-samples and compares the results of each to assess if they are consistent (Hair et al. 1995). If the sample size is insufficient to split the sample in two, an alternative is to use ‘n-fold’ analysis whereby each case is split from a sample in succession, and the accuracy of the predicted membership of the case in a type is computed.

3.4 THEORIES OF FACTORS AFFECTING FORESTRY DECISIONS ON PRIVATE LANDS

As described above, one means of validating a typology is to assess if the factors that differ between the types defined in the typology match those against that would be predicted by theories describing the behaviour of interest. This implies the need to review theories describing the structure of the socioeconomic and individual decision-making processes underlying the adoption of small-scale forestry activities. In the following section various theories about the process of adoption of new practices are reviewed.

3.4.1 Innovation Adoption Theories

The theories describing the diffusion of innovations were used as the basis for extension practices in many parts of the world until the 1980s, at which time these theories, and in particular the way they were applied, were challenged by rural sociologists (Chambers 1989, Vanclay and Lawrence 1995). These theories apply many of the concepts developed by social psychologists in an attempt to explain the process by which new ideas become known in a community and new practices are adopted (Rogers 1995).

According to innovation adoption theorists (for example Spence 1994, Rogers 1995), there are a number of factors that influence decisions to adopt new practices, and the process occurs over a number of stages. A classification of these stages is presented in Table 3.1.

Table 3.1. Stages and factors in the innovation adoption process

Stage in the innovation adoption process	**Factors affecting stage**
Prior conditions	Previous practice Felt needs/problems Innovativeness Norms of the social system
I. Knowledge of the innovation	Socioeconomic characteristics Personality variables Communication behaviour
II. Persuasion to adopt	Relative advantage Compatibility Complexity Trialability Observability
III. Decision to adopt	Above factors
IV. Implementation	
V. Confirmation	Considerations of the effects of the innovation

Source: Rogers (1995).

In the first stage of the process of adoption of a new practice, the cultural setting in which the decision is taking place is thought to have some influence, including the ‘norms of the social system’ and ‘previous practice’ of the decision-maker. Factors unique to the individual which set the scene for later decisions include their ‘innovativeness’, and their ‘felt needs and problems’. The second stage, ‘knowledge of the innovation’ is thought to be almost entirely dependent on the characteristics of the individual. In the next stage, persuasion to adopt, the characteristics of the innovative practice assumes more importance as the decision-maker assesses the utility of the practice in their situation. The final stages in the decision making process, according to these theories, is the appraisal of the relative success or failure of the practice, and modification of the practice to best suit the needs of the decision-maker.

A central tenet of the theory of innovation adoption is that there are a number of different types of people in a community who can be categorised in terms of the way they respond to new ideas and practices. The theories of innovation adoption and social psychology describe the tendencies for people to communicate with others who share and reinforce their own worldviews (Spence 1994, Rogers 1995). Theories of innovation adoption take the concept a further step to link this pattern of communication to the process whereby new ideas are spread through the community. Innovation adoption theorists hold that new ideas and practices are initiated and tested first by the 'innovators', then they spread to 'early adopters' (or 'opinion leaders') if they have utility, and finally to the 'early' and 'late' majorities (Figure 3.2).

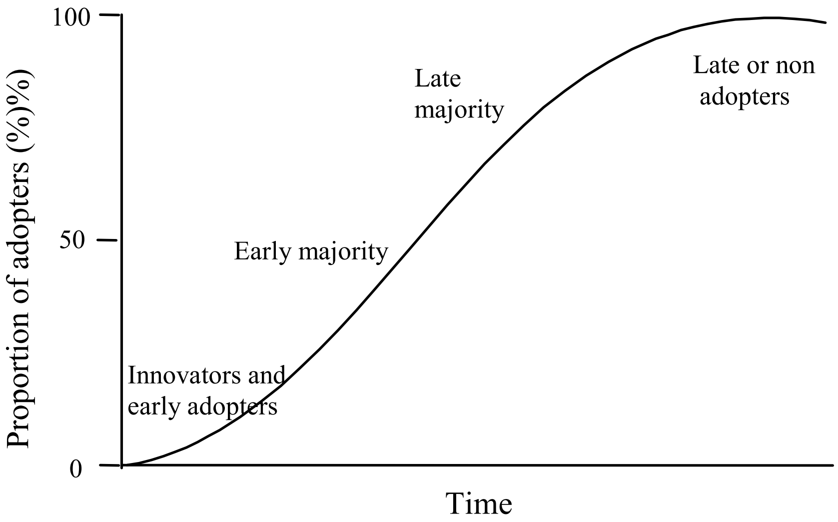

Figure 3.2. The S-curve of the adoption of new practices over time
Source: Rogers (1995).

Repeated studies generated typical psychological and socioeconomic profiles of each of the various groups. The 'early adopters', for example, are characterised as those who are relatively well-off financially, and well-respected socially by members of their community (Table 3.2). Development and extension programs that were guided by innovation adoption theories were based on the rationale that by developing trials with 'innovators' in the community, and by focussing extension efforts on the 'early adopters', the programs could utilise the 'natural' flow of information in communities to stimulate development activity. The rationale guiding the application of the theories is that if well-respected, 'successful' members of the community take-up a new practice, and the practice suits them, then other sections of the community will follow.

Table 3.2. Landholder types as described by innovation adoption theorists

Landholder type	Typical characteristics
Innovators	People of this type are said to like experimentation and risk taking and are termed 'venturesome'. They enjoy trialling new ideas and practices. They are seen as eccentric by other landholders in terms of their ideas and behaviour. They are usually highly educated but not wealthy due to their constant changing of practices and lack of focus on wealth accumulation. They typically have a dispersed friendship network that extends beyond their local area, are keen information seekers, and have the most cosmopolitan worldview of all the various types of landholders.
Early adoptors	These types of landholders are often defined as the 'opinion leaders' in the community and are termed 'respectable'. They are usually relatively well educated, and control landholdings of medium to large size, which they may have inherited. They typically have sufficient resources to allow them to experiment with new practices. Because they have control over larger landholdings, don't deviate greatly from 'normal' practices and have a family history of land management they have the respect of the 'majority' in the community who look to them rather than the more eccentric 'innovators' for advice and ideas.
Early majority	Landholders of this type are interested in using the most productive practices on their landholdings but typically have fewer resources to trial new practices and a lower capacity to translate abstract research results to local farming conditions. This group watches the activities of the 'opinion leaders' and takes up practices they believe have been successful. They can be termed 'deliberate'.
Late majority	This type of landholder is typically more conservative than the above landholder types and can be termed 'sceptical'. They prefer to see widespread adoption of a practice in their area before they are confident to adopt it. They typically have fewer resources than the above types for experimentation, and are unwilling to adopt practices until almost all risk associated with them have been removed.
Non-adoptors	This type of landholder has been termed 'laggards' and 'traditional'. They are thought to be the most local in their worldview, and poorly connected in the social system. They have a high degree of skepticism about change and change agents. Many are in tight financial circumstances and unwilling to trial new practices until all uncertainty is removed.

Source: Adapted from Rogers (1995).

The process of the spread of new ideas through the community has been termed the 'trickle down effect' and was used as the basis of agriculture and forestry development programs throughout the world from the 1960s until the 1980s. By concentrating extension efforts on 'early adopters', those characterised as the opinion leaders in the community, it was hypothesised that scarce resources available to extension programs would be most efficiently used.

The approach to development and extension practices, particularly in developing nations, changed in the 1980s following challenges by academics and NGOs about the failures of this type of ‘top down’ approach to lead to sustainable improvements in the lives of the poor (Chambers 1989, Contreras 2000). A fundamental criticism of the ‘trickle down’ approach is that it invariably led to the promotion of technologies and practices that had been developed without the involvement of the affected communities in determining the issues to be addressed and possible solutions to their problems (Chambers 1989). Other criticisms include allegations that innovation adoption theories place too much emphasis on personality differences as the drivers of differences in behaviour as opposed to economic factors that are beyond the control of individuals, and criticism of the assumption behind innovation adoption theories that innovations are equally valid or applicable to people in all circumstances (Vanclay and Lawrence 1995).

Not all of this criticism would appear to be valid. In fact, innovation adoption theorists including Rogers (1995) have continually stressed the need to ensure the cultural appropriateness of technologies and the role of adaptation of technologies by local people to suit their own circumstances. Furthermore, many aspects of the theories that were developed over time by innovation adoption theorists, in particular the characteristics of innovative practices thought to affect their adoption, as listed in part 2 of Table 3.1, are still thought to be accurate and relevant (e.g. by Fulton and Race 2001). The criticisms of the use of innovation adoption theories to guide the development of research and extension programs that appear to be the most legitimate are the assumptions that the innovations are universally valid and useful throughout the community, and the assumption that knowledge about new practices will naturally spread through the community.

As a result of the criticisms of innovation adoption theories and their application, a new approach to development was instigated that emphasised the empowerment and participation of socially and economically marginalised communities in decisions that affect their lives. The redefining of the approach of development activities to stress the importance of participatory methods, community empowerment, and the importance in supporting locally developed solutions to problems has seen a shift in theory and practices to concentrate on the developing sustainable livelihood strategies (Chambers 1989, Farrington 2001).

3.4.2 Other Decision Making Models Relating to Small-scale Forestry

A number of models have been developed of the decision making process used by landholders when considering the adoption of agroforestry systems. The model of factors developed by Kragten et al. (2001) (Figure 3.3) is a generalised model of the influences on livelihood strategies employed by households, who are seen as the basic unit in the decision making process.

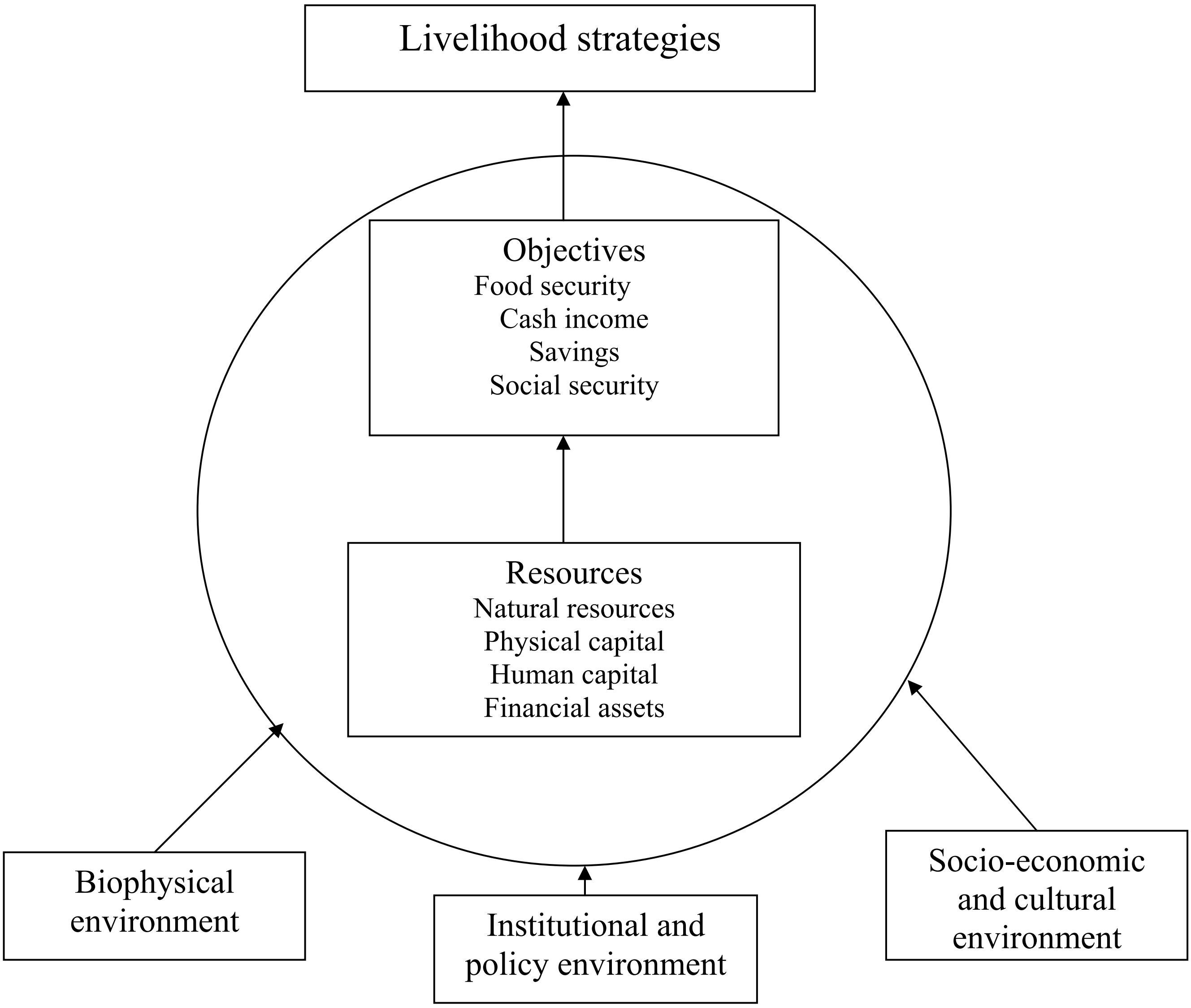

Figure 3.3. Factors affecting livelihood strategies employed by households.
Source: Kragten et al. (2001, p.5).

Kragten et al. (2001) contended that households examine the attributes of the biophysical environment, the signals from various policies and institutions, together with the socioeconomic and cultural environment when determining their strategies. The households' understanding of the attributes of the social, economic and environmental climate in which they operate leads to their own conception of the types and abundance of resources they have available, including their own skills or 'human capital'. The strategy of how these resources are used is then mediated by the objectives of the household in relation to food security, cash income and savings requirements, and the need for social security. The eventual livelihood strategies used by the household is a product of the interplay between all of these factors.

A more detailed model of the decision-making path followed by Australian landholders, which could also be applied in the Philippines, was developed by Fulton and Race (2001) (Figure 3.4). Similar factors to those described by Kragten et al. (2001) are present in this model, together with elements from innovation adoption theories. These factors include external political, social and economic influences, and individual differences in the goals knowledge and attitudes of the landholder. The process of the decision itself is given more emphasis, and greater detail is provided in the Fulton and Race (2001) model in terms of the 'decision influences' such as the decision type, the decision environment, the availability of information and characteristics of the solution (Figure 3.4).

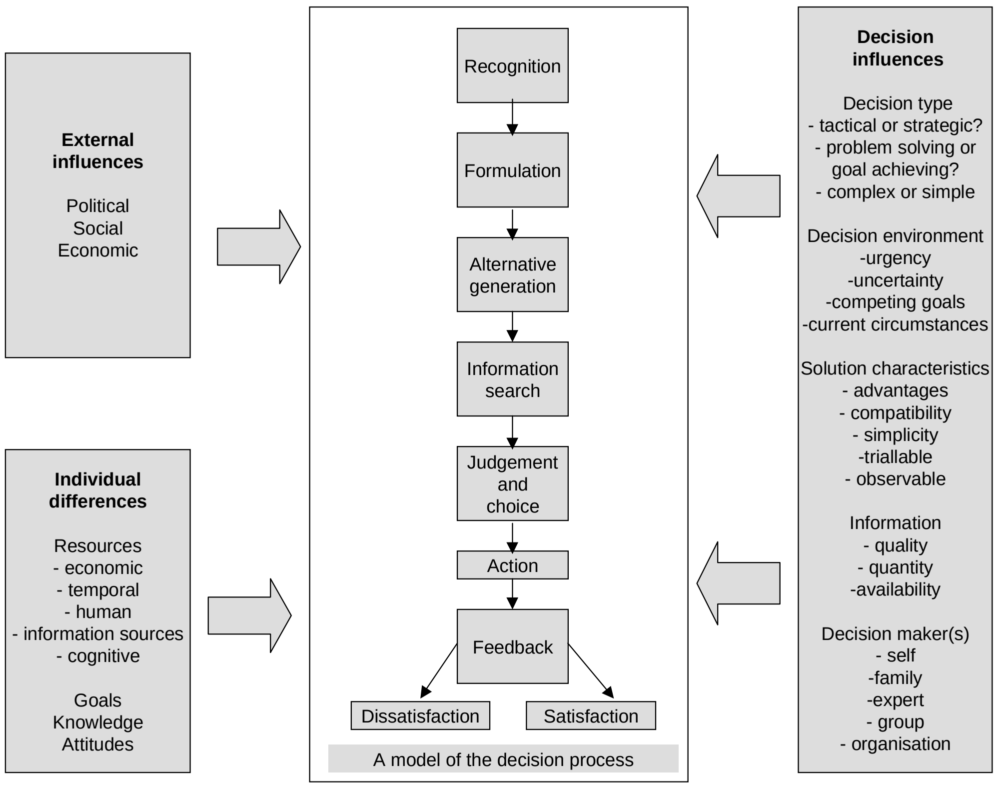

Figure 3.4. A model of decision making: The process and factors influencing it.

Source: Fulton and Race (2002), adapted from Carroll and Johnson 1990; Engel *et al*. 1995.

The pattern of decision-making is basically the same in the decision-making models of Fulton and Race (2001) and Rogers (1995). The decision-making process begins with awareness that there is a problem or a 'felt need' to be addressed. In terms of tree planting, this might be an awareness of the need for soil conservation, or a desire to produce timber for future use or sale by the household. The final decision to plant trees follows on from a process of evaluation of alternatives by the landholders. Rogers (1995) claimed their knowledge of the new practice will be determined by their socioeconomic characteristics, personality variables and communication behaviour. The Fulton and Race model is not so specific about the influence of the various factors during different stages of the process. It does include a set of factors termed 'individual differences' relating to personal resources, skills, goals and attitudes, and another termed 'external influences' including political, social and economic factors.

Innovation adoption theorists have spent considerable effort to ascertain the attributes of a new product or practice that are important when a person weighs up whether or not to adopt the practice. The factors at this stage, also listed by Fulton and Race (2000), include the relative advantage, compatibility (with existing practices), complexity, trialability (or ability to test parts of the practice or trial on a small scale), and observability of the practice.

Some authors feel that social factors should be given more attention when investigating the decision-making processes relating to land-use change (Phillips and Gray 1995, Howden et al. 1998). These authors maintained that the building of social capital or social prestige is an important factor guiding peoples' decisions. These authors maintained that social prestige is gained through behaving in a manner acceptable to others in society, or through participation in specific activities, and social prestige is lost through other behaviour. Social psychologists Azjen and Fishbeen (1990) also highlighted the importance of the opinions of others in the community in decision making, claiming that the person's own understanding of the attributes of a new practice or product is weighed up against the attitudes to the practice or product of other people who are significant to them.

Once a landholder has decided to adopt or expand a practice like tree planting, it is usually in the form of a trial of the practice. According to the above models, the landholders' then re-evaluate their decisions during and after the trial activities to assess whether the expansion of the activity is justified or whether the practice will be discontinued. In this way the process is dynamic with the landholders continually assessing the appropriateness of their practices.

3.5 SUMMARY AND CONCLUSIONS

In this chapter the justification and theories behind the use of typologies to assist natural resource management (NRM) were examined. Typologies are used to help explore, explain and describe the diversity in socioeconomic circumstances and needs of rural households in relation to NRM. A variety of approaches can be used to develop typologies depending on the purpose of the research and the theoretical understanding of the researcher. The choice of the classification scheme used is central to the development of a typology, with the choice of criteria applied informed by previous research and theories describing the factors influencing the behaviour in question. The approaches range from ‘positivist’ methods that use analysis of objectively measured variables, to approaches that use expert opinion to define the types.

Researchers in the fields of forestry and rural sociology have drawn on a number of disciplines to develop theories of how decisions about land management practices are made. The first step in this process included in all theories is the development of ‘awareness’ about a problem (such as land degradation), or awareness of the potential to commence a new enterprise. The development of awareness is hypothesised to be followed by an appraisal of the options for action, then possibly a trial and evaluation of the practice. Each of the theories or models of the factors affecting land management behaviour regard behaviour as a outcome of the interaction between a range of social, economic and environmental factors. The theories are non-specific about the importance of various socioeconomic factors in influencing land management behaviour, perhaps in recognition of the degree of variation of the influence of various factors for different activities and different people within the community. This is an area where the application of typologies could help to investigate the variation in the influence of factors between various types of households.

The potential utility of a typology is another important factor to be considered in the design and application of research which aims to produce a typology. This utility is dependent on the collection and analysis of supporting information, that is, information not used as the classifying criteria for the typology. This information is vital to aid the description and interpretation of the types and to enable the researcher to make recommendations about how to optimise the system under investigation. In the following chapter the studies that have developed typologies in relation to natural and rural resource management are reviewed.

Chapter 4

A REVIEW OF PREVIOUS STUDIES USING TYPOLOGIES TO AID NATURAL AND RURAL SYSTEMS DEVELOPMENT

Chapter 3 outlined how researchers have devised typologies of landholders based on a variety of criteria. The methods used have differed according to the theories used to guide the research and the objectives of the clients or sponsors of the research. This chapter extends the discussion of typologies by reviewing the literature on the use of typologies to assist the design and delivery of natural and rural development programs. The structure of the chapter is as follows. In the first section a typology of typologies used in natural resource management studies is presented. In the second section, the findings of the previous studies that have employed typologies are reviewed and compared. In the final section the implications of these studies and the theories described in Chapter 3 for the development of a typology of rural households in Leyte province are discussed.

4.1 A TYPOLOGY OF TYPOLOGIES USED TO ASSIST RURAL AND NATURAL RESOURCES DEVELOPMENT PROGRAMS

Typologies can be used to classify individuals, households, communities, regions or even nations, depending on the subject and scale of the study and the classifying criteria applied. The researchers that have applied typologies in their work in the field of natural resource management have come from a variety of disciplines in the social and natural sciences including anthropology, social psychology, economics, agronomy, forestry and others. Their disciplinary background, the characteristics and objectives of the funding agency and the level of resources available for research have all influenced the methods that have been applied. The landholder types can be defined according to one or more identifiable characteristic, including characteristics of the farm, the household, or based on psychographic or attitudinal data collected using surveys. An overview of the types of typologies that have been devised to assist natural and rural resources management is presented in Table 4.1. The classifying criterion in this typology is the class of criteria used to segment the population of interest. As indicated in this table, the theoretical framework and focus of typologies varies considerably.

Table 4.1: A typology of typologies used to assist rural and natural resource management development programs

Name of type	Criteria used	Common techniques	Examples
Anthropological	Socio-political and cultural structures and practices, land use practices	Participant observation, qualitative analyses	Conkin (1957), Ooi (1987), Jocano (1998a)
Farming scale and occupation	Scale of operation, ownership, management intensity	Structured questionnaires, cluster analyses	Johnson (2002), AAFC (2002)
Wealth ranking	Socioeconomic factors defined by community involved (participatory)	Focus group discussions, Participatory methods, community immersion	Belsky (1984), Balbarino (2001)
Livelihood strategies	Factors affecting the livelihood of households	Focus group discussions, structured questionnaire, Factor and cluster analyses	Bourgeois (1999), Dorward (2002)
Production characteristics	Elements of production system used,	Structured questionnaires	Kaine and Lee (1994), Landais (1998), Caldwell et al. (2002)
Farming style	Farm management style	Focus group discussions, qualitative analyses	van der Ploeg (1990) Vanclay et al. (1998), Howden and Vanclay (1998)
Attitudinal	Attitudes to natural resources management issues	Structured questionnaires, cluster analyses	Barr (1996), Emtage and Specht (1998), Emtage et al. (2001), Boon et al. (2004)

As with all typologies, the types of typologies presented in Table 4.1 are ‘archetypes’, that is ‘typical specimens’, and the individual studies that are cited as examples did not necessarily use ‘pure’ applications of the research methods associated with the type. The study of Belsky (1984) is an example of this. Belsky applied ‘participatory’ methods in her study of differences between households practicing hillside farming in the Philippines, asking community members to identify the most important factor that differentiates the ‘wealth’ or ‘well-being’ of households in their community. With the community primarily reliant on farming for their livelihood, she applied farming systems analysis techniques, together with analysis of other key factors affecting their livelihood practices. Many of the studies combine research methodologies from different disciplines at various stages in the development of their typology. The selection of the criteria used should be based on evidence that the factors or factor are critical determining factor in the phenomena of interest, and that implies the need for robust understanding of these factors. The practice of using multiple criteria to classify farmers and or households in rural areas is increasing, possibly due to the increased availability of powerful and sophisticated statistical analysis software, and the development of farming systems analysis techniques.

In the following sections each of the types of typology presented in Table 4.1 are examined, and examples of the types are described and discussed. While the typologies of rural households and farmers that have been described for agriculture and sustainable livelihood studies have relevance for this thesis, due to the large number of studies involved the review only describes in detail those typologies relating either the Philippines or forestry development programs.

4.2 ANTHROPOLOGICAL TYPOLOGIES OF RURAL HOUSEHOLDS AND COMMUNITIES

In the Philippines a number of anthropological studies have sought to describe various categories of upland farmers, including those of Conklin (1957), Ooi (1987) and Jocano (1998a). Belsky (1984) reviewed a number of other studies that have differentiated or stratified upland farmers, including Conklin (1957). Conklin (1957) and Ooi (1987) described a number of distinct types of upland cultivators, based on their cultural backgrounds and their farming practices. Jocano (1998a) devised a typology of Filipino communities prior to the influence of the Spanish in the Philippines. These studies are examined in the following section.

Most of the typologies of upland farmers in the Philippines reviewed in this chapter define the main split between farming system types as being between ‘integral’ and ‘partial’ ‘kaingin’ systems. Kaingin is a Tagalog term, the language native to Luzon Island in the Philippines, referring to ‘slash and burn’ or swidden agriculture. Those farmers who practice kaingin farming are known as ‘kaingineros’.

‘Integral’ kaingin practices are extensive and utilise long fallow periods. They are those practiced by indigenous peoples and tribal groups whose ancestors had lived in the uplands for centuries in areas of primary and secondary forests. They avoided conflict with migrating populations by pushing into previously undisturbed forest areas when this was possible. When there they are forced to remain sedentary, however, their land-use practices can be damaging to the soil fertility and structure. Conklin (1957), cited by Belsky (1984), differentiates two types of integral swidden systems, viz. a) pioneer systems where climax vegetation is cleared yearly, and b) established swidden farming, where tree crops are plentiful and little yearly clearing of climax vegetation occurs.

‘Partial’ kaingin practices are described as intensive, short-fallow or permanent cropping systems. These practices are generally undertaken by lowlanders who have little or no land of their own in the lowland regions and who are relatively inexperienced kaingin farmers. They mostly farm at lower elevations and in areas vegetated as grasslands or open brushlands. Conklin (cited in Belsky 1984, p. 14) described those who have some lowland farmland as ‘supplementary’ farmers, and described those who have no lowland farming areas as ‘incipient’ farmers. Both these types of farmers cultivate upland areas in order to supply their families with sufficient food and cash for survival. Ooi (1987) defined another sub-type of the ‘partial’ kaingineros, the ‘land speculators’. These people have some landholdings in the lowlands. They support others to occupy public forestland that has the potential to be declared alienable and disposable. If and when this occurs they can then sell the land for a profit.

4.2.1 A Typology of Filipino Indigenous Communities

Filipino anthropologist Jocano (1998a) developed a typology of Filipino indigenous ethnic communities. The basis for segmenting communities in this case was the degree of shared structural complexities and levels of socio-cultural integration in the communities. The purpose of the classifications was to bring ‘… order into what might have been a confusing array of ethnographic data’ and take ‘… one step beyond the micro-level of ethnographic description to the macro-level of comparative analysis’ (Jocano 1998a, p. 13).

Jocano (1998a) produced his typology of Filipino indigenous ethnic communities by reviewing ethnographic accounts of these communities. He looked for dominant and commonly shared cultural traits and social institutions that characterised the 56 communities at the time the studies he reviewed were written. The classification, which is presented in Table 4.2, was based on traits and institutions that were considered by fieldworkers to be indigenous and stable, those that were well established prior to the influence of Christianity and, to a large extent, Islam.

Table 4.2. Typology of Filipino indigenous ethnic groups

Name	Anthropological equivalent	Subsistence mode and social organisations
Pisan	Band	Small groups of mobile peoples consisting of mostly kinsmen. Main subsistence from gathering, foraging and hunting. Generally headed by a male family or household member
Puro	Kindred	Semi-settled groups in named settlements, headed by eldest member of founding household. Some mobile swidden agriculture.
Ili	Village	Village dwellers practicing mixed wet and dry agriculture. Headed by a council of elders.
Magani	Rank	Larger village units than above characterised by greater division of labour and headed by a warrior group assisted by a council of elders. Practice dry cropping.
Banwa	Chiefdom	Dry crop and hemp cultivators who practice extensive trading. Consist of a number of villages in an area ruled by a datu (Islamic religious leader) that is assisted by warrior and elder councils.

Source: Based on Jocano (1998a).

Both quantitative and qualitative criteria were used to produce the typology. These criteria included the village size, rules of residence, forms of marriage, family and kinship organisation, subsistence techniques, nature of socio-political organisation, and religious rites and ceremonies. The typology classified communities into five groups with varying social organisation. The size and complexity of the social organisation of the groups listed in Table 4.2 increases from the Pisan group to the Banwa group. The Pisan are described by Jocano as a ‘classless society’; lacking in centralised political authority and annual magico-religious festivities, lacking specialists for warfare and crafts, practicing little trading with other groups and having almost total reliance on swidden agriculture for subsistence. The other extreme is the Banwa groups whose basic social organisation covers several villages. The Banwa had complex village alliance systems and legal codes, annual festivities, centralised leadership, craft and religious specialists, marked social stratification, institutionalised warfare, extensive agriculture and trade, and group members had allegiances to groups other than their immediate families (Jocano 1998a). They were the only groups who formed alliance systems that extended further than one village and had a centralised political authority.

The major limitation of Jocanos' work as a guide to the present socio-cultural situation in the Philippines is that the studies on which the typology is based were completed a long time ago, and the study concentrated on factors that were independent of the influence of the Spanish and United States of America colonialists. Some of the studies used were undertaken in the early 1900s and thus do not necessarily reflect the organisation or culture of indigenous communities in the Philippines at the present time. It may be that the previous structure of the communities does have an influence on the present state of the indigenous communities but this aspect was not discussed by Jocano (1998a). The typology of indigenous communities devised by Jocano (1998a) does, however, offer some insight into the history of land use by Filipino communities, adding weight to the descriptions of the general traits of the communities of 'integral' swidden agriculturists and the 'partial' swidden agriculturists that are described as individuals or households by Conkin and others.

4.3 PARTICIPATORY METHODS AND WEALTH RANKING STUDIES USED TO DEVELOP TYPOLOGIES

Various degrees of participation by community members in research activities have been applied in the development of typologies. Some researchers have relied almost entirely on the use of classification criteria defined by the participants in a study (Barbarino 2001). Others use the local knowledge of participants to refine their criteria after selecting broader topics to be used on the basis of conceptualisations developed from theoretical constructs (Belsky 1984, Caldwell et al. 2002) and review of the existing information about the topic of interest (Busck 2002, Dorward 2002).

Researchers throughout the 'developing' world are using participatory rapid rural appraisal (PRRA) methods that employ categorisation of landholders to help describe and analyse the variations in socioeconomic circumstances within rural communities, usually for the purpose of aiding rural development program planning and administration (Belsky 1984, Raintree 1991, Balbarino 2001). In these PRRA studies the community members are allocated into a number of categories according to the subject of the research, an example being the use of 'well-being' categories and categories defined according to houeholds' ownership of means of production. The criteria by which these categories are formed are determined by the researchers in conjunction with key informants from the community involved during focus group discussions. Together, they develop a classification system of socioeconomic characteristics (e.g. land ownership status, off-farm employment status, type of transport owned) that can be used to determine the well-being of the community members. Responses to any surveys and data collected by these studies, including that collected as responses to surveys, are then analysed and reported in terms of the various categories.

4.3.1 Livelihood Studies and Participatory Methods

An early example of a typology of rural households was reported by Belsky (1984). In her study of a community in Baybay municipality, Leyte in 1983, Belsky sought to emphasise the social and economic differentiation in the community, use 'holistic' farming systems analysis, and examine the social processes underlying hillside farming (Belsky 1984). Belsky (1984) reported that her decision to stratify landholders on their rice self-sufficiency was made on the basis of discussions with the landholders whom she asked to describe how they differentiated among themselves. Farmers were apparently in general agreement that their practices and economic and social status were strongly related to the proportion of the households' rice they are able to produce. Three strata were defined: high strata households (35% of households) could produce more than half their yearly rice requirements; middle strata households (43% of households) could produce less than half their annual rice needs; and low strata households (22% of households) could produce none of their rice needs. The rationale for this approach were that it was locally meaningful, it included relative consumption levels, that rice has a high subsistence value and relatively stable price, and that the measure is closely related to other economic indicators (Belsky 1984, p. 53). Belsky reported that the rice self-sufficiency (RSS) of households is related to their land tenure status, livestock holdings, area of coconut orchards, and control of or access to other economic resources. The RSS-based stratification of the community members was also reported to provide insight into what the different sectors of the community values and set as goals for themselves.

The rationale or basis of the typologies devised by Belsky (1984) is that the level of rice producing resources available to a household will have a strong influence on other activities they undertake to secure their livelihood. Thus it is livelihood strategies that are the focus of the method with RSS used as an indicator or categorising criterion. It is understandable that farmers with low levels of food-producing resources (in terms of productive land) or access to regular wage employment will favour production systems that provide early returns to their labour. In their circumstances they have few alternatives. If the only farming practices with which they are familiar are those of the lowlands, then these are the practices they will apply even if these practices are destructive to the upland soils. These types of farmers do not have the luxury of deferring returns for a year or two while changing farming systems even if they are aware that other production systems are more profitable in the long term. On the other hand, if the livelihood needs of the household can be supplied from either rice paddies or regular employment, then these households can afford to employ less intensive practices on their upland farms.

Belsky (1984) noted that the methods she employed to produce her classification system appear to be valid and useful for the locality and time for which the study was made but might not be applicable in other situations. The resources available for rice production happen to be, in this case, central to the livelihood strategies used. One important factor at the time of her study was a severe drought. This reduced the capacity of farmers to produce corn and other basic crops and thus heightened their dependency on rice production. She noted that a number of case studies of similar communities had reported statistically significant differences in terms of the proportion of household income generated from farming and non-farming activities between community members. At the time of her study there were limited opportunities to earn non-farm income and thus the control of rice paddies was a legitimate measure of the socioeconomic circumstances and livelihood strategies of the members of this community. In other situations where it is possible to have relatively greater access to off-farm income, Belsky observed that the use of RSS to stratify a community may not provide the same insight into the livelihood strategies employed by households.

An example of the use of participatory methods to improve existing typologies is provided by the research of Caldwell (2002). In a study of the ability of rural households in Mali to maintain food security in the face of climatic variation, Caldwell (2002) used a pre-existing typology of farmers developed by the Mailian Cotton Development Corporation as a starting point to classify households in two communities. This typology was defined by the productive resources owned by the household, in particular the ownership of draft animals and equipment used to till their farms. The researchers used a series of focus group discussions to then assess whether the community members perceptions of their own ability to maintain food security, and to provide details that enabled the definition of a number of sub-types within the original typology.

4.4 FARMING SYSTEM AND SUSTAINABLE LIVELIHOOD ANALYSES AND THE USE OF TYPOLOGIES

The use of farming systems analyses as the basis for typologies of farmers and their households has been applied in France (Landais 1998), Trinidad (Ganpat and Bekele, 1999), Indonesia (Bourgeois 1999), South Africa (Perret and Kirsten, 2000), South America (Valdivia et al. 2000), Denmark (Busck 2002), Mali (Caldwell et al. 2002), Malawi (Dorward, 2002), Thailand (Trébuil et al. 2002), and Australia (Kaine and Lee 1994, Barr 1996, Howden et al. 1998). Other studies that have used farming systems or sustainable livelihood analyses to develop typologies are not included in this review because of the lack of details about them at the time of writing. Given the number of studies, their methods and finding are not described in detail. Instead the methods used are summarized in tabular form in Table 4.3, and the findings are summarised in Table 4.4.

Table 4.3: Authors, objectives and methods adopted by studies that have used farm systems and sustainable livelihood analyses to define typologies of farmers

Author(s) and year of publication	Location	Study objectives	Data sources and sample size	Criteria and method used to define typology
Belsky (1984)	Philippines, S.E. Asia	Examine the social processes underlying hillside farming practices	In-depth observations and household surveys in one community	Rice self-sufficiency of households
Kaine and Lee (1994)	Victoria, Australia	Facilitation of farm enterprise development by grouping and analysing farms at a similar stage of development	Survey of beef cattle producers in Victoria, Australia. Survey of 2000 farmers, 700 responses.	'Farming context'[a], the stage of development of a farming enterprise, attitudes to various management practices
Barr (1996)	North-east Victoria, south-west New South Wales, Australia	Development of perennial pasture management extension and assistance programs	Analysed 22 studies that had examined pasture management practices, seven of which had developed typologies	Pasture management attitudes and practices. Typology a synthesis of previous studies using expert appraisal.
Howden et al. (1998)	North-east Victoria, south-west New South Wales, Australia	Development of a typology to aid rural extension and assistance programs.	Series of focus group discussions with farmers and extension experts	'Farming style'[b]; strategies used by farmers including enterprise mix and management. Final typology defined by extension experts.
Landais (1998)	France, Europe	Reports on various studies with differing objectives including the development of extension materials and policy analysis	Use detailed on-farm surveys and expert appraisals to specify farm types	Functioning of farms (as `complex steered systems'). Enterprise type, intensity, management; Family objectives, history; Production means; indicators of techno-economic results. Use expert opinion to define 'types' then multivariate analyses to assign farms to types.
Ganpat and Bekele (1999)	Trinidad, West Indies	To identify and describe the latent subsystems of small farms	176 farm households in Trinidad selected by random sampling within the vegetable-based farm system	Farm income; Farmer personal variables; and Farm related variables. K-Means cluster analysis
Bourgeois (1999)	Indonesia, S.E. Asia	To identify a typology of rice-farmers to use in analysis of the impacts of their costs of production and impacts of the Asian economic crisis of 1998.	Survey of 399 farmers using irrigated rice land	Land Tenure System (LTS) typology; Land size; and Household size. Added h.hold and land size to the LTS typology

Table 4.3 (cont.): Authors, objectives and methods adopted by studies that have used farm systems and sustainable livelihood analyses to define typologies of farmers

Author(s) and year of publication	Location	Study objectives	Data sources and sample size	Criteria and method used to define typology
Perret and Kirsten (2000)	Eastern Cape Province, South Africa	To develop a typology of rural households to describe the diversity of rural households to assist the operation of the LandCare program of rural development	Quantitative survey of 81 households	Total income, farming income, access to a pension, access to off-farm income, number of animals owned, and marketing of any farm products. Manual grouping of households.
Valdivia, Gilles and Materer (2000)	Andean Mountains	To develop a typology of farmers to assess their use of climate forecasting	Survey of 45 families	Nine variables were used to identify groups of producers with similar strategies through cluster analysis
Caldwell et al. (2001)	Mali, Africa	Develop typologies of farmers based on resource levels and risk criteria, as the basis for monitoring of crop production practices in response to spatial and temporal climatic variability	Key informants and focus groups in two villages.	Modified existing typology based on ownership of resources for land preparation (e.g. animals). Compared classification of existing typology with classification by key informants, and with self-assessment
Busck (2002)	Western Denmark, Europe	To examine the diversity of landscape management practices among farmers and their impact on landscape structures	Case study approach. Semi structured interviews with 21 farming families over two time periods.	Qualitative analyses of responses to the surveys in conjunction with construction of a Shannon Diversity Index and analysis of the gross change in landscape elements between time periods. Farming styles [b]
Dorward (2002)	Malawi, Africa	Develop a typology of households to assist modelling of potential famine areas and the causes of poverty	National survey (Integrated Household Survey (IHS))	Agro-ecological zone of the household; Market access; and Household resources. K-Means cluster analysis
Trébuil et al. (2002)	Northern Thailand, S.E. Asia	Develop a typology that could be used to develop a systems model of relationships between cropping and land degradation	On-farm survey (no other details specified)	Resource availability and Agricultural production strategies

a. 'Farming context' is a concept developed by Crouch 1981 (cited by Kaine and Lee 1994), referring to the stage of development of a farming enterprise, i.e. the degree to which a farming enterprise utilises 'innovative' or 'best' management practices.
b. 'Farming style' is a concept developed by van der Ploeg (1990) (cited by Howden *et al.*1998, Vanclay *et al.* 1998, Howden and Vanclay 2000), referring to the strategy of farm management adopted by a landholder.

Table 4.4. Typologies of farmers developed using farm system and sustainable livelihoods analyses

Author(s) and year of publication	Typology developed	Notes
Belsky (1984)	Three strata were defined: high strata households (35% of households) could produce more than half their yearly rice requirements; middle strata households (43% of households) produce less than half their annual rice needs; and low strata households (22% of households) produce none of their rice needs.	Rice Self Sufficiency of households is related to their land tenure status, livestock holdings, area of coconut orchards, and control of or access to other economic resources. The RSS-based stratification of the community members was also reported to provide insight into what the different sectors of the community values and set as goals for themselves.
Kaine and Lee (1994)	Five groups such that producers within each exhibited similar attitudes toward confined calving and followed similar management practices (other than confined calving).	Discussed the implications of the groups and relationships with variables not used to cluster farmers. Discuss the step-wise path followed in the progressive adoption of management practices, potential to link farmers in similar circumstances
Barr (1996)	Seven distinct groups of landholders with different socio-economic characteristics, and different attitudes and approaches to land management. Groups included 'The committed', 'Crop focussed' , 'Pasture dabblers', 'Belt tighteners', 'The sceptics', 'The comfortable group', and 'The retreatists'.	Concluded that various levels of enthusiasm for and adoption of perennial pastures by landholders in various 'groups' are rational given their social and economic circumstances. He noted differences in groups with regard to stage of life-cycle and differed in terms of the area of land owned and the extent of reliance on the farm for income.
Howden et al. (1998)	Described more than 20 groups, six main ones. These were 'Innovative', 'Progressive', 'Middle of the road', 'Lifestyler', 'Resource limited-structural', and 'Traditional'	Noted that the concepts and terminology of innovation adoption theorists permeated the perceptions of farmers and extension experts. Later paper describes groups as 'mythical' entities, representations of extremes in styles.
Landais (1998)	Several typologies of farms and regions detailed in paper.	References all in French in paper cited.
Ganpat and Bekele (1999)	Three Sub-groups: Group 1: least number of parcels, smallest farm size, lowest capital base, lowest resource base, used lowest levels of technology and spent least hours in the farm. The operators were the youngest and least experienced, but had highest training score, and generated least income. Group 2: Moderate levels of capital base and resource base. Operators were also moderately experienced in farming, and had lowest economic goal orientation and moderate income. Group 3: Highest number of parcels of land farmed, highest capital base and resource base. Operators were most experienced, had lowest training scores, and generated highest income.	Concluded that the degree of variation in small farmers warranted different approaches for extension and support programs.

Table 4.4 (cont.): Typologies of farmers developed using farm system and sustainable livelihoods analyses

Author(s) and year of publication	Typology developed	Notes
Bourgeois (1999)	Typology describes six basic classes and various sub-classes of farmers. Classes defined on the basis of tenure of land farmed, location of farms and the size of land farmed.	Analysed the evolution of the economic situation of the farmers in differing circumstances and the impact of changes in the prices of farming inputs and sales.
Perret and Kirsten (2000)	Six household types described: either non-farming or farming 1. Very poor single female headed households 2. Pensioners with some subsistence farming activities 3.Adults' households with external activities and sources of income 4. Stock-keeping pensioners 5. Part-time stock-keepers, with off-farm activities and sources of income 6. Full-time farmers	Considered the positions of households and the problems they face given their current socioeconomic characteristics. Also discusses the potential trajectories of each type, what will happen given deaths in the household, or given various potential development activities commencing.
Valdivia, Gilles and Materer (2000)	Describes two main groups, the 'Productive' and the 'Elderly'. Splits the 'Productive' group into three, the 'Productive innovators', and two groups differentiated by their degree of reliance on off-farm income sources.	Defined typologies in two time periods. Little difference in the two typologies apart from greater differentiation of the 'Productive' group in the second typology.
Caldwell et al. (2001)	Malian Cotton Development Corporation typology A: fully-equipped: 2 pairs of draft cattle, plow, cultivator, seeder, and cart B: sub-equipped: 1 pair of draft cattle, either plow or cultivator C: non-equipped: lack draft cattle, incomplete equipment, some experience D: manual: use only manual methods, lack animal traction experience'	Used the previously developed typology as the basis for their typology, adding sub-classes based on key informants and self assessment of vulnerability to climatic variations
Busck (2002)	Defined 5 landscape management styles: 'production enthrone', 'rationale restructuring', 'conservation and enhancement', 'focus close to residence', and 'create a paradise'	Describes the similarities between the styles and other descriptions of the differences between 'full-time' and 'hobby' farmers', but claims that other factors are also important in differentiating styles including the orientation of the farmer to nature values. Rejects the primacy of production strategies as the driver of landscape management.

Table 4.4 (cont.): Typologies of farmers developed using farm system and sustainable livelihoods analyses

Author(s) and year of publication	Typology developed	Notes
Dorward (2002)	Seven types described: 'Remittance households', 'Poor male-headed households', 'Employed households', 'Poor female-headed households', 'Larger farmers', 'Farmers with assets', and 'Borrowers'	Concluded that '…gender of household head, holding size, household size, asset holdings, non-farm sources of income, and agro-ecological zone are all useful and related variables in classifying households, but most of these cannot be considered in isolation as dominant determinants of household welfare and activities' (p.17)
Trébuil et al. (2002)	Type A: small holdings on steep slopes managed by relatively young farmers, who are very much involved in cash cropping (maize, soybean, and vegetables), Type B: medium-sized farms with a rather conservative management strategy (domination of upland rice and maize crop production), Type C: larger, very diversified and relatively well-off farming units managed by early settlers on prime, less steep land with access to water for paddy rice production and capital for establishing perennial plantations	Little detail about the methods used to create the typology in the paper cited. Concentrates on the use of the typology to guide the modelling of factors affecting land degradation in upland areas.

4.4.1 National Typologies of Farms: the US and Canadian Farm Typologies

In the United States of America the recognition among agricultural extension workers, analysts and policy makers of the growing diversity of farms in the nation led to interest in developing more sophisticated and accurate means to describe the diversity of farms. The United States Department of Agriculture (USDA) has developed a typology of family owned and run farms based on information about the occupation category of the owner, together with the assets and sales classes of the farm, illustrated in Table 4.5. The USDA typology has been used to assist the analysis of the variations in productivity, financial characteristics, environmental management, the effects of government policies and extension strategies for these farms at a national level (Sommer et al. 1995, Johnson 2002).

Table 4.5: A Typology of US farms

Type	Characteristics	Notes
Limited-resource	Any small farm with gross sales less than \$100,000, total farm assets less than \$150,000, and total operator household income less than \$20,000.	Limited-resource farmers may report farming, a non-farm occupation, or retirement as their major occupation.
Retirement	Small farms whose operators report that they are retired	Excludes limited-resource farms operated by retired farmers.
Residential/ lifestyle	Small farms whose operators report a major occupation other than farming	Excludes limited-resource farms with operators reporting a non-farm major occupation.
Farming-occupation: low-sales	Small farms with sales less than \$100,000 whose operators report farming as their major occupation	Excludes limited resource farms with operators reporting farming as their major occupation.
Farming-occupation: high-sales	Small farms with sales between \$100,000 and \$249,999 whose operators report farming as their major occupation.	
Large family farms	Farms with sales between \$250,000 and \$499,999.	
Very large family farms	Farms with sales of \$500,000 or more.	
Non-family farms	Farms organized as non-family corporations or cooperatives, as well as farms operated by hired managers.	

Source: Johnson (2002).

The data used to develop the USDA typology was gathered in the 1997-98 Agricultural Resource Management Study (ARMS). The ARMS is run annually, using a sample of approximately 9000 farmers to represent estimated 2 million family' owned and run farms operating in the United States of America. The survey collects data to measure the financial condition and operating characteristics of farm businesses, the costs of producing agricultural commodities, and the well-being of farm-operator households.

4.4.2 A Typology of Farms Developed for Canada

Like the Department of Agriculture in the United States of America, the Canadian government department responsible for Agriculture, namely Agriculture and Agri-Food Canada, developed a typology of farms to help describe the diversity of farms in Canada and aid in the analysis and reporting of statistics about the agricultural sector (AAFC 2002) (Table 3.6).

Table 4.6: A Typology of Canadian farms

Type	Characteristics	Notes
Retirement	Farms managed by an operator 60 years of age or older receiving pension income.	No children involved in the day-to-day operation of the farm.
Lifestyle	Small farms (revenues of $10,000 to $49,999) managed by families with off-farm income greater than $50,000.	This category excludes the retirement category.
Low income	Small and medium farms (revenues of $10,000 to $99,999) managed by families with total income less than $28,000	This category excludes the retirement and lifestyle categories.
Small business focused	Revenues of $10,000 to $49,999	Excludes family farms in the retirement, lifestyle and low-income categories
Medium business focused	Revenues of $50,000 to $99,999	As above
Large business focused	Revenues of $100,000 to $499,999	As above
Very large business focused	Revenues of $500,000 and over	As above
Hutterite colonies and other communal operations as well as non-family corporations and co-operatives.		

Source: AAFC 2002.

Similar to the USA typology, the Canadian typology is a ‘structural’ typology based on readily measured factors relating to the organizational structure of the farm, the age of the farmer, the degree of dependence on off-farm income, the total family income, and the revenue class of the farm. The typology has seven types, six for family farms and one for non-family farms. References on the Canadian Agricultural Department website indicate that more detailed publications about the Canadian farm typology will be released in the near future.

4.5 TYPOLOGIES OF FARMERS DEVELOPED ACCORDING TO THEIR ATTITUDES TO FORESTRY

Raintree (1991) recommended the definition of a set of internally homogenous user groups as a starting point for the design of any agroforestry systems. Tree growing technologies can then be matched to the user groups, and finally tree species to the technologies. In relation to the adoption of farm and community forestry, Raintree (1991, p. 8) stated ‘It is … obvious that the different uses of trees have different degrees of relevance to different users and that the socioeconomic attributes the individual user (as conditioned by his or her position within the social structure) must somehow influence and set limits on the relevance of particular trees’. Table 4.7 summarises various ways that landholders can be classed, including by tenure and type of production, by landholding size, by farming system type, by economic orientation and by type of participation.

The criteria recommended for creating typologies by Raintree (1991) are all readily identifiable characteristics of rural households, their enterprises and their landholdings. These criteria are relatively easy to measure and, when used to segment the population, are likely to provide greater insight into the variations in the suitability of various types of forestry development for different types of households than would be the case if population averages were used to assess the situation. However, the typologies that have been developed of rural households reported in literature have all been based on measurement and analysis of farmer and rural households’ objectives, attitudes and perceptions of forestry activities rather than the characteristics of their enterprise or landholding. Typologies of rural households in relation to forestry development have been developed in Australia (Emtage and Specht 1996, Emtage and Specht 1998, Fulton and Race 2000, Emtage et al. 2001), Denmark (Boon et al. 2004), Belgium (Serbruyns et al. 2004), and the United States of America (Jacobson 2004). These typologies are reviewed in the following section.

Table 4.7. Some criteria for defining the forest users and farm and community forestry clientele

User category	*Comments*
Producers	
Forest producers – by tenure, type of forest production:	
Foresters	Professional foresters, private forest owners
Traditional forest users	Hunters, foragers, shifting cultivators, herders
Encroachers, poachers	Illegal in formal law but may have rights in common law
Forest labourers	Paid for labour, may engage in other exploitative activities
Farmers	
By size of landholding:	
Medium-large farmers	Exact size limits vary from area to area
Small farmers	Exact size limits vary from area to area
Landless and marginal farmers	Depend on wage labour and gathering
By farming system type:	
Long-fallow shifting cultivation	R value ≤ 10 [a]
Bush fallow cultivation	R value 10-33
Short fallow cultivation	R value 33-66
Permanent arable cropping	Field cropped annually
Multiple cropping	More than one crop/year
Perennial crop plantation	Usually tree crops, often internationally traded commodities
By economic orientation:	
Subsistence	Production for own consumption or informal exchange
Mixed or 'subsistence plus'	most common orientation of small farmers
Commercial	Production for cash sale
By type of tenure or participation:	
Land owner	Freeholder, owner operator, absentee landowner etc
Usufruct right holder	Tenure usually secure but rights limited
Tenant	All forms of rent, lease or sharecropping
Borrower	Based on informal reciprocity rather than formal exchange
Farm labourer	Full or part-time, continuous or temporary
Squatter	Illegal occupier but some rights usually recognised
Livestock producers:	
Ranchers	Modern commercial extensive range management
Pastoralists	Traditional nomadic, semi-nomadic or transhumant herders
Agropastoralists	Part-time herding in combination with cropping
Mixed farmers	Limited livestock production closely integrated with cropping

[a] The R-value classifications are based on Ruthenburg (1971). The R-value is defined as (cropping period + (crop + fallow period)) x 100, and is equivalent to the percentage of land in cultivation over a year.
Source: Rocheleau (1986), as cited by Raintree (1991).

4.5.1 Typologies of Landholders According to Forestry Development Attitudes in Australia

The basis of the typologies developed by Emtage and others was to group together landholders with similar attitudes to farm forestry. Following Byron (1987) and Raintree (1991), they argued that improved understanding of landholders reasons for and constraints to tree planting and management would enable policy makers and extension personnel to better target their forestry development programs to meet the differing needs of various types of landholders. The criteria applied to generate the typology were cluster analysis of ratings of the importance of various reasons for and restrictions to tree planting and management (Emtage 1995, Specht and Emtage 1998, Emtage and Specht 1998, Emtage et al. 2001). The types were then tested to assess whether they differed in terms of their average socioeconomic characteristics and their present and intended tree planting and management behaviour. In reports of these studies, five types of landholders are described which differ significantly in their attitudes to farm forestry and in some socioeconomic and behavioural characteristics. The types range from landholders on relatively large properties with a long history of land management and a low interest in tree growing, to those on smaller properties with shorter periods of land management and high interest in tree growing.

The typology of landholders was tested in two ways in the two regions in which the studies were undertaken. In the first instance sets of five interviews were carried out with members of each type plus five interviews with respondents who were not classified into a type using by the cluster analysis procedure (Emtage and Specht 1998). These interviews largely confirmed the understanding of the characteristics of the distinct types, provided insights into their land management strategies, and into the landholders' vision of the potential role of tree planting and management. In the second instance, the results of a landholder survey and subsequent cluster analyses were presented to a group of farm forestry extension personnel (Emtage et al. 2001). Prior to being shown the results of the cluster analysis and subsequent analyses to examine the characteristics of each group and differences between groups, the extension personnel were asked to define and briefly describe common types of landholders in the north Queensland region. They were then asked to assess if their intuitive understanding of the variation in landholder types in the region matched the types defined through the cluster analysis of the responses to the landholder survey, and to provide a name that is an appropriate description of the types identified. The names given and some of the socioeconomic characteristics of the types are reported in Table 4.8.

Table 4.8: Selected characteristics of north Queensland landholder groups identified through the use of cluster analysis of ratings of importance for various reasons for and constraints to tree planting and management

Group name	Land size (ha)	Cropping (% of holding)	Native forest (% of holding)	Time managed (years)	Income (% from holding)	Family work hours per week
High intensity farmers	58	47	9	16.5	45	60.1
Retired professionals and hobby farmers	54	16	31	14.4	36	44.8
Progressive second generation farmers	81	37	11	18.4	54	64.4
Traditional farmers	100	45	25	27.0	71	99.1
Comfortable farmers	74	38	27	21.5	62	54.5
Mean	69.2	35	25	19.3	53	56.9

Source: Emtage et al. (2001).

The 'retired professionals and hobby farmers' groups and the 'traditional' group appear to represent the extreme positions of landholder types. They have the smallest and the largest landholdings respectively, and are at the extremes of the range in the proportion of income from the landholding, and the length of time over which the landholding has been managed by the same operator. Furthermore, 'retired professionals and hobby farmers' have the lowest proportion of their land used for cropping, the highest proportion under native forest, and the least average hours per week labour input from the family (Emtage et al. 2001). As well, this type has the highest level of past tree planting activity, and the highest proportion who intend to plant trees for mixed timber production, aesthetic and environmental reasons in the future (Emtage et al. 2001).

4.5.2 Farm Structural Characteristics and Forestry Industry Structures in Australia

Fulton and Race (2000) developed a guide typology of landholders which matches landholder types with various sectors in the timber industry, alternative plantation designs and various potential marketing arrangements, as presented in Table 4.9. The typology is intended as a guide only, and Fulton and Race (2000) stated that regional studies are required to identify local variations. Note that the landholders include all those who could potentially be involved in the development of timber plantations on private and public land including urban investors and municipal governments.

Table 4.9. Typology of farm forestry landholders and industries

Industry	Landholder	Marketing arrangement	Design
Small-scale specialty timber sawmill	Commercial farmers with some silvicultural experience; Small-scale landholders.	Market brokers.	Timberbelts; small woodlots (1-5 ha).
Medium-scale hardwood sawmill	Commercial farmers with considerable forestry expertise; Small-scale urban investors.	Grower cooperative; Forest management team; 'Marketing' joint ventures.	Timberbelts; woodlots (2-10 ha).
Large-scale integrated softwood and MDF mill	Commercial farmers with under-utilised land; Small-scale urban investors; Corporations and government with under-utilised land.	Joint ventures with industry sharing the establishment costs and undertaking much of the forest management; Grower cooperatives; Forest management team.	Woodlots and small plantations (10-40 ha).
Large-scale pulpwood mill	Commercial farmers with under-utilised land; retiring farmers; Corporations and government with under-utilised land; urban investors.	'Lease' joint ventures; Grower cooperatives; forest management team; market broker.	Wide timberbelts, woodlots and plantations (10-100 ha).

Source: Fulton and Race (2000).

4.5.3 Typologies of Landholders in Northern Europe According to Forest Land Management Attitudes

Several studies have sought to identify and describe typologies of forest owners in Denmark and other parts of Scandinavia and Northern Europe (Boon et al. 2004). These studies have revealed that forest land ownership is becoming more heterogenous in the past decades, with a higher proportion of present owners pursuing recreational and aesthetic objectives, a higher proportion of female owners, increasing average age of forest owners, and a higher proportion of forest lands having multiple-owners than in the past (Lönnstedt 1989 Ripatti and Järveläinen 1997, Kline et al. 2000a, 2000b, Lidestav and Ekström 2000, Lidestav and Nordfjell 2002, Härdter 2002 , Boon 2003, Bieling 2004, all cited in Boon 2004). Boon et al. (2004) compared the characteristics of these typologies and defined a set of five types common to each of the studies. These types are:

- The ‘Economist’ owner type is primarily financially motivated, partly through sales income, partly by seeing the forest as an investment object and as providing economic security. Some studies add ‘pride’ (Bieling 2004) and ‘forest as a legacy’ (Kline et al. 2000a, 2000b) to this owner type’s motivations.
- The ‘Multiobjective owner’ is motivated by financial, but also recreational, environmental and other values related to forest ownership.
- The ‘Recreationist’ owner primarily values non-timber and non-monetary values, such as recreation, nature conservation and management. This owner type represents the consumption-oriented owner, to whom the forest is a source of personal benefit, whether it is personal wood supply, recreation or to keep the forest in family ownership. This owner type generally owns less forest compared to the ‘economist’ and the ‘multi-objective owner’ types, and his/her main income comes from outside forestry. Part-time or no agricultural affiliation is more common here relative to other owner types.
- The ‘Self-employed’ owner type values the forest as a place to work for leisure, to get labour income, and likes to see the forest grow between his/her hands.
- The ‘Passive owner’ type is the type of owner to whom no objectives are really important, except to simply own the forest and keep it in the family.

In their analysis of the types of forest owners in Denmark, Boon et al. (2004) used data from a survey that employed a structured questionnaire of more than 1500 forest owners. The basis for the typology they formed was the responses to 16 questions about the importance of various reasons for managing forest areas. The responses were analysed using both Wards’ method of hierarchical cluster analysis and K-means cluster analysis, and the results were compared. With similar results obtained for each analysis, the results of the K-means analysis were selected for reporting. Three types were identified, including ‘classic forest owners’, ‘hobby owners’ and ‘indifferent farmers’. The characteristics of each of these groups are presented in Table 4.10.

Table 4.10. Combined typology of Danish forest owners

Type	Characteristic objectives	Other characteristics
Classic forest owner	High ‘economic’ objective, moderate environmental and recreational objectives. Highest number of days per year spent in forest	Comprise approximately 40% of forest owners in Denmark, control approx. 60% of private forest areas. Have largest average forest size, most likely to be full-time forest owners
Hobby owner	High hobby objectives (hunting, forest tending, recreation), high environmental and aesthetic objectives, lower economic objectives than ‘classics’.	Own smallest average area and have lowest affiliation with agriculture of all types. Tend to have family owned forests and live furthest from them of all types.
Indifferent farmer	Lowest ratings of importance for all reasons for forest ownership. Higher ratings for aesthetic reasons and biodiversity conservation than other reasons.	Strong agriculture affiliation. Larger average areas of forest than the ‘hobby’ type, but spend less time per year in the forest. Most likely to live close to their forest of all types.

4.6 COMPARING THE METHODOLOGIES USED TO CREATE TYPOLOGIES OF FARMS AND RURAL HOUSEHOLDS

Typologies can be used to classify individuals, households, communities, regions or even nations depending on the subject and scale of the study and the classifying criteria applied. Differences in methods can be noted between those studies that concentrate on studying the variation within a particular rural enterprise such as dairying or beef cattle grazing, and those which are interested in management variations in relation to aspects of natural and rural environments common to a variety of enterprise types. Examples here include the management of trees on private lands, weed management, or management of rural landscapes.

The definition of landholder types can be imposed according to one or more identifiable characteristic, including characteristics of the farm and the household, or based on psychographic or attitudinal data collected using surveys. The selection of the criteria used to create a typology is usually based on evidence that the factors or factor have a strong relationship with the behaviour or phenomena of interest, and that implies the need for robust understanding of these factors. Many of the studies combine research methodologies from different disciplines at various stages in the development of typologies. Previous studies in similar contexts that have examined similar topics provide the researchers aiming to develop a typology with a guide to the factors that have been found to be related to the phenomena of interest. In most cases the relationships are not simple, and involve interplay between various socioeconomic and personal factors.

One fundamental difference between those typologies that have sought to classify rural households in relation to agriculture as opposed to forestry is that the typologies relating to forestry have all used attitudes to or objectives sought from forestry as the criteria to define the types. In the following section the justification for using attitudes to practices as the criteria for defining a typology of rural households is examined in more detail.

4.6.1 The Use of Attitudinal Criteria to Create Typologies

The various theories used to guide the creation of typologies of natural and rural resource management all hold the view that attitudes to land management practices are important in determining the way that land is managed. The question of interest for this thesis is: can attitudes to forestry be measured and analysed in a manner that will allow the development of typology of rural households that will aid the design and implementation of forestry development programs in Leyte province, the Philippines? The criteria to judge whether a typology will aid a forestry development program includes whether the typology aids understanding of the socioeconomic factors affecting the present and potential forestry activities of the households, and whether the typology will enable targeting of the program to address the differing needs and wants of households in differing socioeconomic circumstances and with differing value systems.

On a theoretical level, the question is: Are perceptions of the potential functions of, and constraints to, a particular practice sufficiently indicative of a household's objectives, value system, and socioeconomic circumstances to justify their use as the sole criteria for developing typologies of rural households? This depends on the conceptualisation of the role of attitudes in determining behaviour and, to some extent, universality of the practice under examination.

What do the theories about the relationship between attitudes and behaviour have to say? The theory of reasoned action (Ajzen and Fishbien 1980) maintains that a person's intended behaviour is a result of the interaction between what they believe will be the outcome of a particular behaviour, balanced by what they believe others who are significant to them believe about the 'appropriateness' of the behaviour. Attitudes to a particular behaviour thus represent a summary of a persons' intended behaviour, incorporating their perception of the resources available, the opinions of others significant to them, and the utility of the behaviour in question.

Attitudes are reasonable indicators of a person's behavioural intentions. In marketing research the use of peoples' attitudes to the benefits sought from a product as the basis for developing a typology is known as 'benefit segmentation' (Hawkins et al. 1991). The rationale for this approach is that it is the land managers' subjective appraisal of the biophysical, social and economic conditions in which they live that governs their actions. It is the decision-makers perception of the quality and quantity of resources at their disposal and their perception of the rules and social norms governing the use of the resources that is important in determining their behaviour, rather than the way that an 'expert' may appraise these factors and an appropriate behavioural response. Cultural factors, including cultural norms and memory, affect the repertoire of practices perceived by rural households as appropriate in any set of circumstances. Strong relationships have been found between social status and particular land management practices. The personal objectives of the decision-makers are important in determining land management strategies, as is consideration of the life-cycle of the household. Using attitudes to a particular practice or product as criteria for forming a typology takes into account the numerous social, biophysical and economic factors affecting peoples' judgement. The key to the success of the approach is to ensure that peoples' attitudes are adequately measured. This measurement may be achieved using either qualitative or quantitative methods, or a combination of the two.

4.6.2 Is There a Master Typology?

Typologies created using attitudes as the classifying criteria can be representative of the broader diversity among rural landholders if the practice is not restricted to a particular enterprise. If the practice is restricted to a particular enterprise such as livestock raising – for example confined calving, as was the focus of Kaine and Lee's 1994 study – then the criteria can only be used to differentiate between farmers that have cattle. If the practice is fundamental to all rural land management, as is the case for the management of trees, water or weeds, then it has potential to be used as the basis for constructing a more generally representative typology of rural households. This proposition is discussed further below.

On a practical level it has been demonstrated that attitudes to land management practices can be used as the criteria on which to base the construction of typologies, and that types defined using attitudinal criteria also differ on the other socioeconomic dimensions that are known from previous studies to be influential in determining land management behaviour and livelihood strategies. Emtage and others have assessed similarities in the demographic and socioeconomic characteristics of landholder types created using attitudes to tree planting and management as the classification criteria (Emtage and Specht 1996, Emtage and Specht 1998, Emtage et al. 2001), and typologies created using other criteria relating to agricultural practices (Rogers 1995, Barr 1996, Howden and Vanclay 1998). These analyses revealed numerous socioeconomic and demographic differences between the types. These differences included characteristics of the farm (the size of land operated, the proportion of land under natural forest, types of enterprises operated, number of trees planted), the economic position of the farm household (level of income and income sources), and characteristics of the farm household (formal education levels, the history of farm family, use of information to support management decisions). A comparison of the characteristics of the types defined by Emtage and others using these techniques with the typologies produced by Barr (1996), Howden and Vanclay (1998), and the types of households by innovation adoption theorists (Roger 1995), revealed that each of the typologies described similar sets of types in more or less detail (Emtage, in press). The conclusion reached was that each of the typologies had identified sets of the same 'fundamental' types of landholders in Australian rural areas. A high degree of similarity also appears to exist between these types and those described by Johnson (2002) for the USA Department of Agriculture typology. This conclusion that there is a fundamental typology of rural landholders is reinforced by Landais (1998), who argued that there is in fact one 'true' typology of farmers for a region.

Landais (1998, p.516) argued that the use of a the 'biotechnical functioning of production processes' as a set of criteria, supported by data that cover the range of factors affecting land management and enterprise decision making, allows the development of a typology which has the potential for multiple uses. Indeed, he argued that defining typologies that are designed to address a particular element of land management, such as environmental management, are:

> '…of little use and relevance for action. On the contrary, the above approaches consist of examining the ways in which the problems to be dealt with present themselves in each one of the types of a single typology, irrespective of whether these problems relate to production, environment, agricultural policies, etc. The

> different functions which the typology are meant to fulfill are, however, not consistently compatible; this leads to prioritising dynamic aspects and, therefore, strategic criteria rather than criteria describing in detail the biotechnical functioning of production processes.'

The implication is that there is one 'true' typology of farmers, and that the way this typology is analysed and described should be altered to reflect the purpose of the research.

Given the similarities between the types of farmers and their households in Australia described by Emtage (in press), the assertion of Landais (1998) that there is only one 'true typology' of rural households is credible. The assertion that there is only one 'true' method to undertake typologies of farms is, however, debatable. If the criteria used to define a typology are practically and theoretically linked to farm households' livelihood strategies, are adequately investigated, and are supported by other data summarising the production, demographic and socioeconomic characteristics of the household, there appears to be no reason why criteria other than those that relate to the production processes of the farm cannot be used. This is particularly true if the criteria used are directly related to the focus of the research, and consistency can be demonstrated between the socioeconomic and demographic characteristics of the types and theoretical conceptions of the factors related to the phenomena.

One striking difference between the typologies of farmers and rural households which are developed for the study of agriculture as opposed to those based around the study of forestry is that the typologies that have been developed for forestry are all based on analysis of the attitudes to, or objectives for, the management of trees in the rural landscape (Emtage and Specht 1998, Emtage et al. 2001, Boon et al. 2004, Jacobson 2004, Serbruyns et al. 2004). The use of attitudes in developing typologies relating to farm forestry can be justified in part because of the strong non-economic (i.e. environmental and personal) dimension of forest management. These studies have all been undertaken in 'developed' countries including Denmark, the United States of America and Australia. These studies contrast with those that have been undertaken in 'developing' countries, which have all focussed on agricultural practices and, in many cases, broader livelihood strategies of rural households.

There is an increasing trend for large portions of rural land in many regions of developed countries to be managed by owners who are not reliant on agriculture or forestry activities for their livelihood. These types of owners are more interested in the ‘consumptive’ (i.e. aesthetic and environmental) facets of rural landscapes rather than the ‘productive’ facets (Wilson 1992). The changes in rural land ownership have changed the way that rural lands are managed (Wilson 1992, Barr 1996, Emtage and Specht 1998, Emtage et al. 2001, Howden and Vanclay 1998, Busck 2000, Johnson 2002, Boon et al. 2004). Busck (2000) discussed a period of ‘post-productivism’ in European rural areas, the influx of hobby farmers, and other ‘lifestyle’ owners that has affected the rural landscapes of Europe. The values and land management objectives of these types of owners differs markedly from ‘production-orientated’ farmers. This is not to say that the majority of farmers do not value trees in the rural landscape and the environmental services they provide, just that most of the ‘residential’ and ‘hobby farmer’ types of landholders are reported to be more highly motivated to manage their land in a way that maximises the environmental functions of the landscape rather than the economic functions. Whether landholders in developing countries including the Philippines have similar objectives for tree management as landholders in developed countries is yet to be assessed.

4.6.3 The Use of Participative Methods to Define Typologies

The practice of using participative methods to generate the criteria used to classify farmers into types has become increasingly common for a number of reasons. Some of the advantages are that using participative methods:

- can help to reduce the costs of research by reducing the need for detailed on-farm surveys and analysis of the responses;
- ensures that the local context of the research is considered; and
- aids in the communication and adoption of the research findings.

Some typology researchers have used a combination of criteria defined by participative methods and theoretical considerations in their studies (Caldwell et al. 2002). In the study of Caldwell et al. (2002), the researchers applied a series of criteria relating to the farmers’ ownership of farming animals and implements used in developing previous typologies, and then added farmers’ own criteria and a self-assessment process before compared the resulting typologies. They concluded that the typology was improved by the addition of criteria considered relevant by the farmers themselves, adding richness to the typology through the definition of a number of ‘sub-types'. The usefulness of the application of self-assessment by the farmers is in doubt, however, as the correlations between the classifications (i.e. between the self-assessment and expert assessment) varied highly between the sites in which the study took place.

While most researchers appear to agree that participative methods are useful for developing typologies for the reasons given above, these methods also have their limitations. One disadvantage of using participative research methods and expert appraisals to define typologies is that the selection of criteria and the cut-off values for types may be inaccurate if the participants are not familiar with the phenomena of interest (Landais 1998). Another disadvantage is that the differences in value systems and socioeconomic circumstances within the rural community may be so large that the key informants have profoundly negative opinions about sections of the community they are asked to describe (Vanclay and Howden 2000).

Howden and Vanclay (2000, p. 206) have argued that a typology should have 'social legitimacy' if it is to be valid. They stated that:

> 'if a classification of social behaviour is to have theoretical and practical utility, it must possess sociological explanatory power and predictive capacity. Classifications should also have social legitimacy, a property all too often missing from structure-based classifications imposed (etic) rather than derived (emic). From farmers' perspectives, classification schemes based on wealth, size (of property) or adoption behaviour have little explanatory power, predictive capacity or social legitimacy'.

Howden and Vanclay (2000) argued that 'social legitimacy' is an important criterion that should be used to judge the worth of a social classification scheme such as a typology, and that to have this, the classification system should be based on the farmers' perspectives rather than be imposed by researchers. They further implied that a classification system that is based on single criteria, whether it relates to the level of resources available to households or a specific type of behaviour, lacks a number of desirable characteristics of typologies.

It is interesting to note that Howden and Vanclay (2000) chose to use extension experts to interpret the farmers' descriptions of themselves because the farmers from various areas did not always use the same terms to describe groups that appeared to the researchers to be similar types. Another problem faced by these researchers is that the terminologies applied by farmers to describe the styles of others were frequently derogatory. The result of these negative descriptions was that when they attempted to identify specific cases of each to undertake further study to verify the results of the focus group discussions they employed, they found that the farmers were unwilling to associate themselves with negative images of land management, and often chose elements of what had been thought by researchers to be examples of opposing styles as being ‘most like themselves’ (Howden and Vanclay 2000). Howden and Vanclay concluded that the descriptions they had gathered through focus group discussions represented a ‘mythology’ of farming styles, a description of farmers collective understanding of the range of strategies that can be used in their land management activities.

4.6.4 The Dynamics of Typologies

A typology is a static picture of the types of farms or farming households at a point in time. The dynamic nature of farms and farming households is an important consideration relevant to typologies overlooked by many of the studies reviewed for this thesis. As Landais (1998, p.506) pointed out, ‘(i)n the present demographic, socio-economic and regulative conditions, farm characteristics are changing rapidly with the result that typologies soon become obsolete. As a consequence, they need to be updated periodically, while the process of change itself also needs investigating.’

Landais (1998) discussed the concept of ‘evolutionary trajectories’ whereby the operations of farms are constantly changing. Factors that may influence these changes include technical innovations in production, signals from markets for agricultural products and inputs to the production process, as well as changes in the economic and social characteristics of the region in which the farm is located, and the stage in the life-cycle of the farm household. In order to understand the evolutionary trajectory of a particular type of farm, it is necessary to either gather data about the characteristics of the farm and farming household at a number of points in time, or else gather data about the strategic decision making of the farming household so that the possible evolution of the farm or farming household from one type to another can be anticipated.

4.7 COMPARING THE FINDINGS OF PREVIOUS TYPOLOGIES IN DEVELOPING COUNTRIES FOR ALL PURPOSES

Typologies of rural households in developing countries have concentrated on describing the diversity of livelihood strategies employed, mostly in reference to the control of farming land and farming equipment which are the dominant factors of production in these study areas. The main factors that differentiate between the types are the quantity and quality of income producing resources controlled by the households, including the stage in the life cycle of the household members (Perret and Kirsten 2000, Valdiva et al. 2000, Trebuil et al. 2002). In particular, these studies differentiate between households the members of which are above and below 'productive' age, the age that people can still undertake physically demanding farm labour. Several of these studies stress the potential importance of off-farm income sources to many household types, most often in the form of remittances to the household from relatives who have moved to urban areas or other locations offering the potential for employment.

In general, three types of households are defined by studies in developing countries. The first is the poorest households the members of which have the least access to land and farming equipment, tend to occupy the poorer quality land, and have less ability to access credit facilities to purchase seeds and fertilisers to undertake farming activities. The middle ranking households have greater access to productive resources than the poorest households, and may have some have family connections which send them remittances. The wealthiest households described by these typologies tend to have the greatest access to land, farming equipment and credit. They also tend to control the better quality land in terms of slope and soil fertility, and may also receive a remittance that provides them with capital to improve their agricultural activities.

4.8 COMPARISON OF THE FINDINGS OF PREVIOUS TYPOLOGIES IN RELATION TO FORESTRY

The studies that have generated landholder typologies in relation to forest management have all been carried out in developed countries. These studies and their reports have a number of similarities in terms of the methods used to develop the typology and the typologies they describe. The typologies have all been based on analysis of the importance that the landholders place on various functions of their forest areas, or the objectives they have for managing their forests. These objectives or functions have typically included conservation or enhancement of the environmental, recreational and aesthetic values of the forest, and economic production from forest areas through timber production and, or, leasing the area for recreational activities.

There are many socioeconomic factors that have been reported to differentiate between landholder types in all of these studies and numerous similarities in the characteristics of the types. These factors again include the economic characteristics of the landholding, including the size and productivity of the landholding, and the degree of dependence of the landholder on the property for income. These factors also include social characteristics, including the history of family ownership of a landholding, the family size and structure and time in life-cycle, and personal characteristics including the level of formal education of household members. Landholders' attitudes to land management issues, including the legitimate role of governments and the relative importance of biodiversity conservation, are likewise similar between the types described by different authors.

Some generalisations can be made about the relationship between socioeconomic characteristics and the perceived importance of various potential functions for forests and objectives for forest management. In general, those landholders in developed countries with a low level of dependence on their landholding for income also have relatively high levels of formal education, and relatively small parcels of land. They tend to be located nearer to urban areas than other types, have a relatively short history of rural land management, and place the greatest importance on managing the forest for 'consumptive' (aesthetic, recreation, and biodiversity) values as opposed to 'productive' values (including timber harvesting) and a high proportion of their land is under forest. The other extreme is the landholders with large properties, who have relatively low levels of formal education, own land inherited from their parents, and have a strong orientation to the management of their land for 'productive' purposes relative to 'consumptive' uses. Between these extremes are a number of groups which tend to have more varied or mixed objectives for their forest management, and are more variable in terms of their socioeconomic characteristics.

In that typologies relating to forest management were all carried out in 'developed' countries, and given the differences between the socioeconomic characteristics and cultural values of developed and developing countries, it is unlikely that similar forest management objectives and similar types would found in developing countries such as the Philippines. It is important, therefore, that the perceptions of the community members involved in the research are adequately considered prior to the design of any questionnaire used to gather data for the construction of a typology. This is particularly true where there is a lack of previous research into the objectives of landholders for their forest management in an area.

4.9 WHAT IS THE POTENTIAL ROLE FOR A TYPOLOGY OF RURAL HOUSEHOLDS IN LEYTE PROVINCE, THE PHILIPPINES?

What role can a typology of rural households play in assisting forestry development programs? What a typology can do is provide an overview of diversity of socioeconomic circumstances and value systems in the community. The extent to which the typology can be used to do this and its' ability to help explain the relationships between socioeconomic factors and behaviour depends on the quality and quantity of data available to support the typology. In the first instance a typology provides an overview of the range of objectives for forest management in a community. Beyond this a typology may then offer insight into the relationships between households' socioeconomic circumstances, attitudes and their behaviour if there is sufficient supporting information. Typologies could certainly benefit from being combined with farming systems analysis and other sociological studies to improve understanding of the way that these types have arisen and may change over time.

In the majority of cases the research projects that have defined typologies for aiding natural resource management in developing countries have been funded by rural development programs. In these examples the focus of the research has been agricultural or livelihood systems used by households rather than forest management. Poverty alleviation is the most pressing development challenge in these countries, particularly in rural areas. It is important that forestry development is placed in context with other development issues facing the communities, and that understanding of the livelihood and land management systems used by households is developed by the present study.

The utility of the typology is an important consideration for researchers in determining the methods that are applied. The use of typologies has the potential to improve the efficiency and equity of development programs. Where the research has been enterprise-focused, such as in the studies of Kaine and Lee (1994) and Fulton and Race (2000), the needs of the research sponsor can affect the choice of method used. In the case of rural industries, knowing which types of landholders are likely to have compatible objectives and business structures that suit them for specific roles in these industries can greatly assist industry in developing partnerships with landholders, and developing communication and strategic plans for the industry members. These studies have focused on the role of improving the efficiency of industry.

In other studies, the aim of the research has been to illustrate the diversity of landholders in the rural community to assist in the promotion of sustainable land management practices (Barr 1996, Specht and Emtage 1998, Howden et al. 1998, Emtage et al. 2001). These studies have produced landholder typologies that attempt to be exhaustive and illustrate the full range of landholder variation in relation to the land-use activity under consideration, one that cuts across rural enterprise types. Their rationale is that because landholders are in differing economic circumstances and have differing value systems, policies and programs will vary in their impacts upon them. These authors argue that public policies need to take account of these variations in order to both be efficient and to ensure social equity. The development of rural industries has been highlighted as an important means to improve the management of natural resources and tackle poverty in the Philippines (Government of the Philippines and the World Bank 2000). It could be argued any typology developed in relation to forestry for rural households in the Philippines has practical utility if it improves understanding of the variations in households' perceptions of development needs or improves the potential to develop small-scale forestry as a sustainable livelihood enterprise for rural households in the Philippines.

4.10 SUMMARY

It is clear that many researchers interested in rural development see a role for landholder typologies to assist in the design and delivery of development programs. As outlined in this chapter, various methods can be used to construct landholder typologies. These methods vary according to the theoretical approach used by the researcher and the purpose of the research. The main function of typologies is to improve the understanding and description of the diversity of landholders' values, attitudes, behaviour and socioeconomic circumstances in rural communities. The application of typologies offers the opportunity to improve the efficiency of extension programs through greater understanding of the circumstances in which landholders are operating, thus providing the potential to tailor the programs and communication strategies to specific needs. For private industries seeking partnerships with specific types of landholders, typologies can assist in identifying the landholders of interest and ways to design the programs to stimulate landholders' interest. In the public sphere the application of typologies offers the chance to improve the equity of extension programs by explicitly describing variation in the community and designing programs to suit the varied needs of the community.

The limitations of typologies should be recognised and typologies should not be expected to represent every variation of landholders in a community. It can be difficult to identify specific examples of various types. Typologies can potentially assist in the design of extension programs at regional and possibly at national levels where their application offers distinct advantages over the use of simple averages to describe the characteristics of rural landholders. While typologies can assist industries to target specific landholders and can assist the development of suites of programs to address common issues, they cannot replace the need for those offering advice to landholders to develop an understanding of the landholders' individual circumstances. It can only be hoped that the use of typologies will lead to the development of suites of public and private extension programs that are tailored to the variety of needs and circumstances of landholders. Once suites of programs are available, or variation within programs is able to account for variations in the needs and circumstances households, it will then be up to the landholders and their advisors to select appropriate programs for their own needs.

A notable deficiency in the literature is that there are no examples of typologies of rural households from developing countries in relation to forestry in the literature reviewed for this thesis, and there are no examples of typologies of rural households in the Philippines over the last 20 years. Therefore, it would appear that the development of a typology of rural households in the Philippines in relation to forestry could assist in the design and delivery of forestry development programs.

Chapter 5

METHODS USED TO COLLECT DATA AND ANALYSE RELATIONSHIPS BETWEEN RURAL HOUSEHOLDS' SOCIOECONOMIC CHARACTERISTICS AND THEIR FORESTRY PRACTICES

The data used in this thesis was gathered using a survey of households in four rural communities in Leyte province, the Philippines. This chapter concentrates on describing the methodology that was used to gather and process the data derived from a household and community survey involving a total of 200 households from across four communities in the Philippines.

5.1 OVERVIEW OF SURVEY METHODS

The survey used to provide data for this thesis had four main parts. These parts were intial focus group discussions which were used to guide the development of a questionnaire, a survey involving interviews of 200 interviews of household members in four rural communities in Leyte Province using the questionnaire, focus group discussions to validate the results of the survey, and a workshop with representatives from the communities and government agencies to discuss the policy implications of the survey findings. Each of the communities that were approached agreed to participate in the research activities. Prior to the commencement of the survey, community meetings were held to explain the nature of the research project and ask whether the community wished to participate. A schematic diagram showing the processes followed in the survey is illustrated in Figure 5.1.

The structured household interviews provided the majority of the data used to analyse the relationships between socioeconomic characteristics of households and their tree management behaviour and attitudes, and construct a typology of rural households, the main focus of the thesis. The central research question of the thesis was addressed by applying a series of cluster analyses to the ratings of importance given to the various scales of reasons for and constraints to tree management. Following assessment of the results of the cluster analyses to see if they were robust, the socioeconomic and demographic characteristics of the groups formed through the cluster analyses were tested for differences. The results of these tests were used to assess the predictive validity and practical utility of the cluster analyses, and to develop a typology of households in relation to their tree management behaviour.

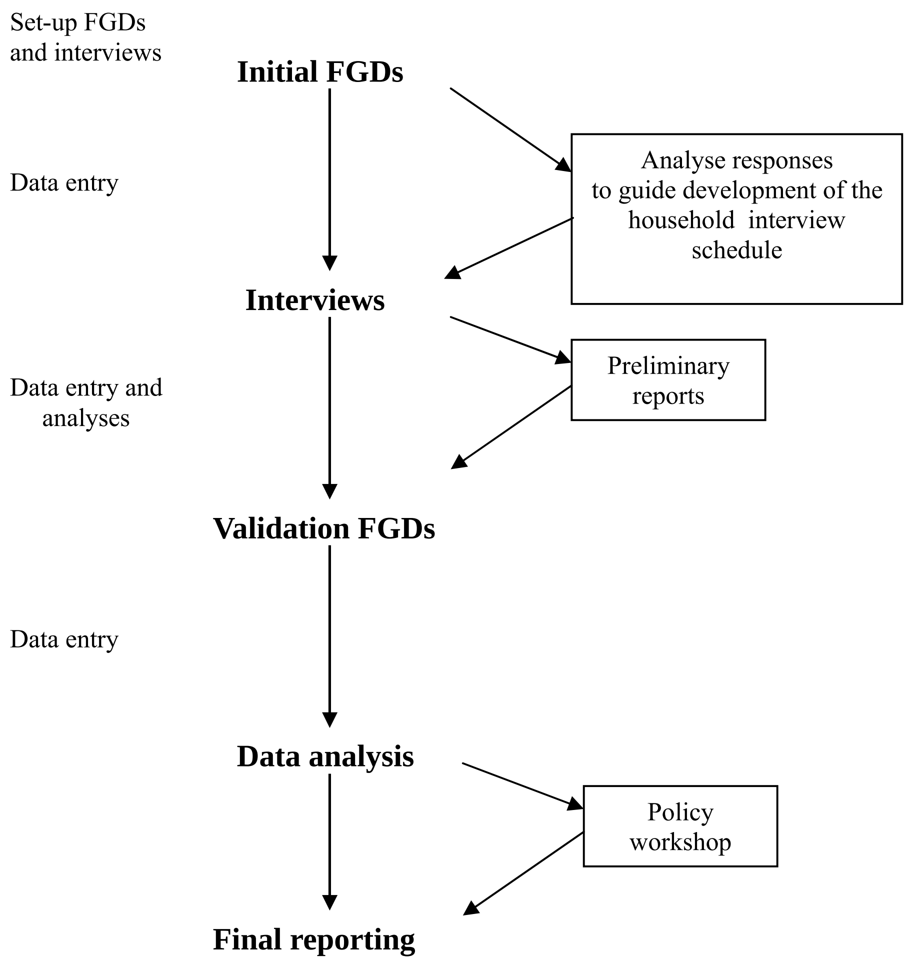

Figure 5.1. Overview of the elements and processes in the household and community survey

The research for this thesis was funded in part by the Australian Centre for International Agricultural Research (ACIAR) Smallholder Forestry Project. This project is a collaborative research program funded by ACIAR involving researchers based at the University of Queensland, Australia, and Leyte State University, the Philippines. The research program is designed to identify the social and economic factors affecting the development of small-scale forestry in Leyte province. A number of other research projects were run concurrently with the research for this thesis. These include investigations of the factors affecting the success of community organisations (Estoria in prep.), the use of nurseries to provide extension material to small-scale foresters (Gregorio et al. 2004), the factors leading to the failure of mirco-financing arrangements in regards to forestry in Leyte (Peque in prep.), potential carbon sequestration from small-scale forestry (Sales 2003), and other projects.

In the following sections the methods used in the study are described and discussed.

5.2 PREPARATION FOR THE HOUSEHOLD AND COMMUNITY SURVEYS

The four communities were selected for involvement in the survey on the basis of their geographic spread around the province of Leyte, their past experience with community forestry programs, their established contacts with the College of Forestry at LSU, their stability in terms of peace and order, and their variety in terms of topography, access to markets and community size. All four communities have participated in community forestry and other development programs and partnerships in the past (Mangaoang and Harrison 2003). Members of the research team involved in the ACIAR funded Smallholder Forestry Project travelled to the communities twice in the year 2001 for meetings with community members to discuss with community members their willingness to participate in the survey and their experiences with small-scale and community forestry. Each of the communities approached agreed to participate in the research program.

The interview schedules were prepared following a project-planning workshop held at Leyte State University in February 2002. This workshop was attended by researchers from Australia, and Filipino researchers from various faculties in Leyte State University, Local Government Units and the DENR. During the workshop the results of literature reviews for this thesis and proposals of the survey methods were presented to participants and discussed. Prior to the finalisation of the survey methods both formal and informal meetings were held with various members of various faculties at LSU to assist the planning of the survey. Consultations included discussions with the head of the Centre for Rural Social Research, Dr Vega; various members from the National Abaca Research Centre and the GIS Centre; the LSU Director of Research; the University President, Dr Milan; and members of the Farm and Agriculture Resource Management Institute (FARMI). Consultations were also held with members of international research and development agencies located at LSU which were also undertaking research related to the development of forestry and agroforestry in Leyte, including representatives from the German

Tropical Ecology Program (GTZ), and the World Agroforestry Centre (formally known as ICRAF). A workshop to finalise the topics covered in the interview schedule used for the survey was conducted at the Centre for Rural Social Research in June 2002, attended by the enumerators employed for the project, Dr Vega, Dr Mangaoang, Bert Nasayao (head of research with the DENR, Region 8), and Dr Stark of ICRAF.

5.2.1 Literature Review of Previous Studies of Factors Affecting the Adoption and Choice of Smallholder Forestry Systems

Prior to the survey being undertaken, a literature review was made of material relating to small-scale and community forestry in the Philippines, focussing in particular on previous surveys of households and communities involved in community or social forestry programs, plus reports from studies that addressed the topic of ‘socioeconomic factors affecting the practice of small-scale or community forestry in the Philippines’. Other topics that were examined in the literature to a lesser degree include natural resource management issues in the Philippines, agrarian reform programs, soil conservation practices and programs, upland farming development programs, and social and political history of the Philippines.

Literature was collected from a variety of sources in the Philippines, in Australia and on the World Wide Web or Internet. The majority of references were gathered from the libraries of Queensland, Leyte State University, the University of the Philippines Los Bańos Forestry School, various libraries at the University of the Philippines, Quezon City campus and the Institute for Philippines Culture at Ateneo de Manila University. Researchers involved in community forestry development at the Ford Foundation Philippines Headquarters, the Asian Development Bank and the World Bank were contacted and provided a number of relevant articles. The National and Regional libraries of the government department the Department of Environment and Natural Resources (DENR) were also used. Parts of the literature review included in the this thesis were presented to workshops held at Leyte State University in February 2002, and further discussed with faculty members of the College of Forestry and the Centre for Rural Social Research at Leyte State University.

5.3 FOCUS GROUP DISCUSSIONS USED TO GENERATE BACKGROUND DATA

The first major data gathering activity was a series of focus group discussions (FGDs), one held in each of the communities. The purpose of these FGDs was to generate background information about the community, such as the community history, and to generate data for use in the household interviews.

The focus group discussions and household interviews were carried out by a team of 11 enumerators employed for the task. English is commonly understood throughout the Philippines. Due to the influence of the American administration of the Philippines from 1900 to 1950, English is the official language used in the National government, schools and universities. It was observed that the people in the rural communities could in nearly all circumstances understand English, but they were not confident to express themselves in English in front of strangers, and had considerable difficulty interpreting Australian as opposed to more familiar American accents. As a consequence, the meetings and household interviews were carried out in the local dialects, either Cebuano or Waray Waray depending on the location of the community within Leyte.

There were several reasons (or objectives) for holding preliminary Focus Group Discussions (FGDs) before the household interviews were undertaken. These were:

1. To obtain background information about the barangay not likely to be found in the documents of the barangay.
2. To improve understanding of the barangays in terms of their history and community dynamics.
3. To gather the information needed for the final development of the household interview schedule.

The importance of ensuring that the interview structure was put into local context was recognised at an early stage in the project by the author, and stressed on numerous occasions during discussions by researchers experienced in working in the Philippines.

5.3.1 Participants in the Preliminary Focus Group Discussions

The first series of focus group discussions (FGDs) in each of the communities were run during June and July 2002. There were between 18 and 30 participants involved in each of the FGDs. Participants were selected by the barangay captain according to the criteria specified by the FGD team. The criteria were that participants should:

- Have lived in the barangay for at least 10 years;
- Include representatives from the Senior Citizens, Farmers, Zone and Sitio Leaders, Barangay officials, and the Sangguniang Kabataan (Youth Sector).

5.3.2 Methodology of the Preliminary Focus Group Discussions

A set of six activities were conducted during the FGD were chosen to meet the objectives set for the FDGs described above. The activities were:

- community mapping;
- documenting the history of the community;
- compilation of a lists of reasons for and constraints to tree planting and management;
- a SWOT (strengths, weaknesses, opportunities and threats) analysis of the community;
- documenting the typical annual activities of the barangay; and
- compiling of lists of characteristics of various well-being categories of households in the barangay.

In order to get through the large number of activities in one day, the participants at the meetings were split into two groups, and the meetings were split into two sessions. In the morning sessions the two groups went through half the activities each. In the afternoon sessions the groups were brought back together and the results of the morning session were presented and discussed by all participants. The division of participants into two groups in the morning session resulted in more manageable group sizes, thereby avoiding excessive arguments among participants, and reduced the potential for one or two individuals to dominate proceedings. The splitting of the group into two sets also allowed a greater number of activities to be completed during the day. Each sub-group was assigned topics to complete. Mini workshops conducted by the sub-groups reduced the time needed to complete the activities. During the afternoon sessions, the results were presented to the whole group for verification of information obtained. Thus only half the participants at the meetings completed each activity in detail during the morning sessions, but all participants had the opportunity to consider and comment on all of the activities during the afternoon sessions.

The preliminary FGDs were conducted in the communities in late July and early August (July 26, 2002, Barangay Tigbao, Matalom Municipality, July 27, 2002, Barangay Conalum, Inopacan Municipality, July 30, 2002, Barangay Poting Bato, Isabel Municipality and August 1, 2002, Barangay Rizal II, Babatngon Municipality). The methods adopted for each of the activities undertaken in the FGDs are described in detail in Appendix A.

5.4 HOUSEHOLD INTERVIEWS SURVEY DESIGN, SAMPLING AND ANALYSIS STRATEGIES

The primary purpose for undertaking a series of structured interviews with households in rural communities in Leyte was to develop a quantitative dataset that could be used to analyse households' present and intended forestry practices and to then develop a typology of rural households. The research problem addressed in this thesis is: Can the social and economic factors that affect the development of small-scale forestry in the Leyte Province, the Philippines, be identified, and how can the social and economic diversity in rural communities be defined and described so as to assist in the design and delivery of rural and natural resource management development programs? In assessing this question, it is necessary to investigate the factors that influence a household's forestry practices and their variation within and between communities.

Previous research into and theories about smallholders' forestry practices in the Philippines suggest that a variety of personal, social, economic, and institutional factors affect the type and intensity of a household's forestry activities (reviewed in Chapter 7). In designing the structured interview schedules, attempts were made to cover the range of personal, social, and economic factors that may influence a household's present and intended forestry practices. The topics covered in the survey examined the livelihood sources of households, with a particular focus on the biophysical and social characteristics of land managed by the household, their farming practices, tree management activities, and sources of off-farm income. The influence of institutional factors were partly investigated during the household interviews through assessment of households' membership of, and perceptions about, community organisations, and analysis of their attitudes to various constraints to tree planting and management. Examination of the influence of institutional factors was undertaken during the policy workshop. Details of the topics covered during the household interviews and the format of the schedule are described in the following section.

5.4.1 Topics Covered in the Household Survey

Following the completion of the initial FGDs, the information gathered was reviewed and compiled into reports. The first development of the household interview schedule was undertaken following review of the ACIAR Smallholder Forestry Project proposal. Information for the ACIAR project that was to be gathered from households was listed and a draft schedule of topics prepared. The interview schedule was then constructed by with reference to the results of the initial FGDs, before being translated, and checked, by the author and enumerator team. A pilot survey was undertaken involving five households in a community separate from the communities subsequently surveyed. Some changes were made following the pilot survey to clarify the questions and recording processes prior to applying it in the four participating communities. The topics included in the survey included the:

- demographic characteristics of the household;
- present livelihood activities and sources of the household;
- attitudes to tree planting and management;
- present and intended tree planting and management activities;
- perceptions of development priorities; and
- perception of community organisations.

The demographic data sought during the survey included details of the age, formal education and training, and livelihood activities of all household members over 12 years. Other demographic data included some factors identified by community members during the initial focus group discussions as discriminating between households with varying levels of 'well-being'. These included the number of children in the household, whether children attend school, the house construction materials, if transport is owned and the type of transport, membership of organisations, and types of training which has been completed by household members. The household's attitudes to various reasons for and constraints to tree planting and management on their land were measured using a five-point Likert scale. The items included in the interviews were those identified as relevant to community members during the initial focus group discussions.

Where the responding household members managed land for farming, data relating to the farming system they practice was collected. These data included details of the types of crops grown and the proportions that are sold, plus information about the tree species currently growing and those intended to be grown on each land parcel managed by the household. Details about the tree species currently managed by the household included information about whether the species was planted or regenerated naturally, the source of the planting material, the perceived functions fulfilled by the species, if the species would be used for timber and the types of products to be made, if the species would be sold the proportion to be sold, expected market location and expected price that would be achieved. Similar details were collected about the intended tree planting and management activities for the household.

Data about the development priorities of the household was collected in several formats. Respondents were asked to indicate in their own words the most urgent ecological problems facing the barangay and the most important development needs of the barangay. They were then asked to rank in priority the five most important development activities needed by the barangay from a list of eight potential activities. Finally, respondents were asked to indicate if they had been involved in community organisations or community forestry programs, and to indicate the advantages and disadvantages of community organisations.

The structured interview schedule was first drafted in English by the author then translated to the local dialects by the enumerators. The enumerators then translated the responses back to English for entry into the SPSS software package for analysis. The questions used to gather data for each of the topics and the format of the questions are presented in Table 5.1. The household interview schedule was structured following these topics, and is included in Appendix B.

Table 5.1. Topics and variables included in the structured interviews of households

Topic	**Topic item**	**Notes**
Attitudes to tree planting and management	What roles are trees currently expected to fulfil? (reasons for planting and management) What are the perceived constraints to greater planting of trees?	Likert scales used
Present and intended tree planting and management activities	How many trees does the household currently manage? What are the functions fulfilled by trees for the household at the current time? (up to 3 per species) What proportion of each species is expected to be utilised for domestic purposes and for sale? What areas on the landholding do trees occupy? (categories) What information sources were used to assist in tree planting and management?	Data for present tree species managed by the household collected per species and per farming parcel
Demographic and socioeconomic characteristics	Number of people in the household Age of people in the household, Non-farm income sources Education levels, plus types of training completed If own transport owned and type of transport Proportion of staple and total food needs of the household produced by the household House construction materials	Details recorded for each household member (over 12 years of age) plus information about children in the household
Perception of community organisations (CO)	Is a household member a member of the CO? What are the advantages and disadvantages of CO's? What are the most useful activities for CO's to undertake? Has the household ever participated in a community forestry project in any way?	
Development priorities	Most important development needs of the community (open question) Most important ecological problem of the community (open question) Priorities of community development activities (ranking, closed question)	
Present livelihood activities	Listing of the types of activities used to generate goods and services for the household Number of plots managed by the household Land size (per farming parcel used), slope , irrigation and tenure Use of materials from public lands past and present (species used, products made and income derived) Types of crops grown (per land parcel managed, proportion sold, income derived) If have livestock, (if sold, income made)	

5.4.2 Sampling Strategy Used for the Household Interviews

Although the initial intention was to carry out a survey of households that was representative of the population in Leyte province, a number of factors prevented this, although the eventual sample was found to be broadly representative. A number of practical constraints limited the choice of communities including the lack of information about the variance of rural households' tree management activities in the total population. The practical resource constraints were the limited time and budget available for the survey and the number of topics to be covered. The ACIAR smallholder forestry project had a number of objectives that required data from a survey of smallholders. With the high cost of undertaking surveys it was decided to cover as much of these data as possible in one survey. This meant that the survey instrument rapidly grew in size and scope. Given that the approach being used had not been used in the Philippines before (i.e. the development of a typology of landholders and analysis of the relationships between a broad range of social and economic factors and tree management behaviour), the research was exploratory and it was concluded that it was an advantage to include a broad range of factors. It further allowed the potential to use the data base for assessment of other behaviours, including farming systems research, analysis of the household livelihood strategies, assessment of timber supplies and markets for smallholders, assessment of their nursery practices and assessment of households' involvement in community organisations.

Two other factors had an important bearing on the decision, both of which depended on the fact that the Leyte State University had previous contacts with the barangays. The first of these was the instability of the peace and order situation in the Philippines. Whilst the situation in Leyte is not as serious as in other parts of the nation, the Australian researchers were advised by local people that there are a number of areas in Leyte where we should not travel, including many parts of the remote areas in the upland region of the island. The second factor related to the need to develop trust between the community members and the researchers in order to have the best chance of getting willing participation in the research and reliable information. The lead up to the actual interviews involved open meetings to discuss the research project as well as the FGDs to generate background information. These processes also took time and financial resources but they did work reasonably well.

It was concluded that the communities proposed by the college of Forestry research team members did in fact provide a reasonable representation of the diversity in biophysical, market access and cultural conditions in the province. Two of the communities were located in upland areas and two in lowland areas. Further, the communities stretched from the southern border of the province to the north, and at least one community was located in the Waray-dominated eastern side of the island. The market access of the communities also varied considerably, with two communities located on major sealed roads and two on unsealed roads remote from large markets.

During the household survey systematic sampling was used to select 50 households in each community. This number of households was selected as trade-off between the budget available for the project, the need for sufficient cases for statistical testing, and the need to collect sufficient detail to allow for assessment of tree planting and management practices in the context of the household socioeconomic characteristics, farming practices and development priorities.

Some consideration was given to the idea of using the community maps developed during the FGDs to guide the selection of a stratified sample of the households in the communities. The idea was to use the community's classification of the households into well-being classes as the basis for stratifying the sample, with the sample selection chosen to reflect proportion of households in the community in each of the well-being classes. After discussions with the enumerators and researchers based at LSU it was determined that a systematic sampling method would be likely to produce a representative sample that also reflected the proportion of households in the various well-being categories. To obtain a representative sample, a systematic selection of households was therefore used, with the number of households in the barangay was divided by 50 to give 'j'. The resulting number was used to select the households to participate in the survey, with enumerators working along streets attempting to contact every 'j^{th}' household. For example, if there were 200 households in the barangay, the enumerators attempted to interview every fourth household from a list of households provided by the barangay chairperson (e.g. 200 households/50 = 4). If the household could not be contacted they then moved to the neighbouring household on the left, then the right, until a household could be contacted who was willing to participate.

Enumerators were selected that had degrees in either forestry or agricultural science, with preference given to those with experience in undertaking surveys or community development work. A total of 10 enumerators were employed to carry out the survey. During fieldwork they split into five teams of two people each. The pairs were determined in part by the enumerators themselves, ensuring that each team had a male and female member, with one having a background in agriculture and the other forestry. The breadth of the topics examined meant that the questionnaire was large in terms of the number of questions and the time that was required to complete each household interview. The enumerators were asked to complete 2 household surveys per day whilst in the communities.

The team of 10 enumerators spent a week in each of the communities involved in the survey to undertake the household interviews. After a week in the field the enumerators returned to LSU for a period of two weeks to enter the data before starting interviews in the next community. The responses were encoded in English into SPSS in the case of the household surveys, and in the case of the FGDs the responses were entered into the Microsoft Word program in Cebuano or Waray Waray plus English.

5.4.3 Response Rates to the Household Interviews

The enumerators reported that only three households refused to participate in the survey at the first community, due to misunderstanding about the purpose of the survey. This misunderstanding was subsequently clarified following the calling of a community meeting to discuss the purpose of the survey with community members. The community members were apprehensive about the survey because of the comments that had been made by the army captain stationed in the community at the time. Apparently this captain had told the community members that the methods which had been used in the initial focus group discussions, in particular the community mapping and discussion of well-being classes, were techniques commonly employed by insurgent groups operating in the area. Some community members had therefore concluded that the survey team were in fact part of an insurgent group.

A total of 203 interviews were carried out across the four communities, 50 or more in each (Table 8.2).

Table 5.2: Number and proportion of households interviewed per community

Community	Frequency	Proportion of total households sampled
Conalum	52	13%
Poting Bato	51	34%
Rizal II	50	22%
Tigbao	50	22%

5.4.4 Data Transformation and Recoding

Following the entry of data into the SPSS program and checking for typographic errors, continuous variables were examined to assess the need for transformation prior to undertaking statistical tests for relationships between variables.

The measures of household income, cash remittances to the household from outside the community, land area, and distance to farm plots were found to be highly negatively skewed. These were transformed using a log10 function in the SPSS program. The transformed data was used in regression, correlation and one-way ANOVA tests where appropriate. In descriptive tables of the report the data displayed is the untransformed data, unless otherwise indicated, to aid the interpretation of test results. The summary of the methods used to transform and analyse the data are indicated in Figure 5.2.

Categorical variables and responses to open-ended questions were examined to determine if sets of categories could be defined that adequately described the variations in responses. In cases where there were a broad range of responses, a set of new variables were defined from the initial variable. In the first instance the re-categorisation of responses was designed to assist the description of responses. Where there were more than four or five categories, a second re-categorisation procedure was followed to reduce the number of categories so that statistical testing for relationships between variables could be undertaken with sufficient observations in each category.

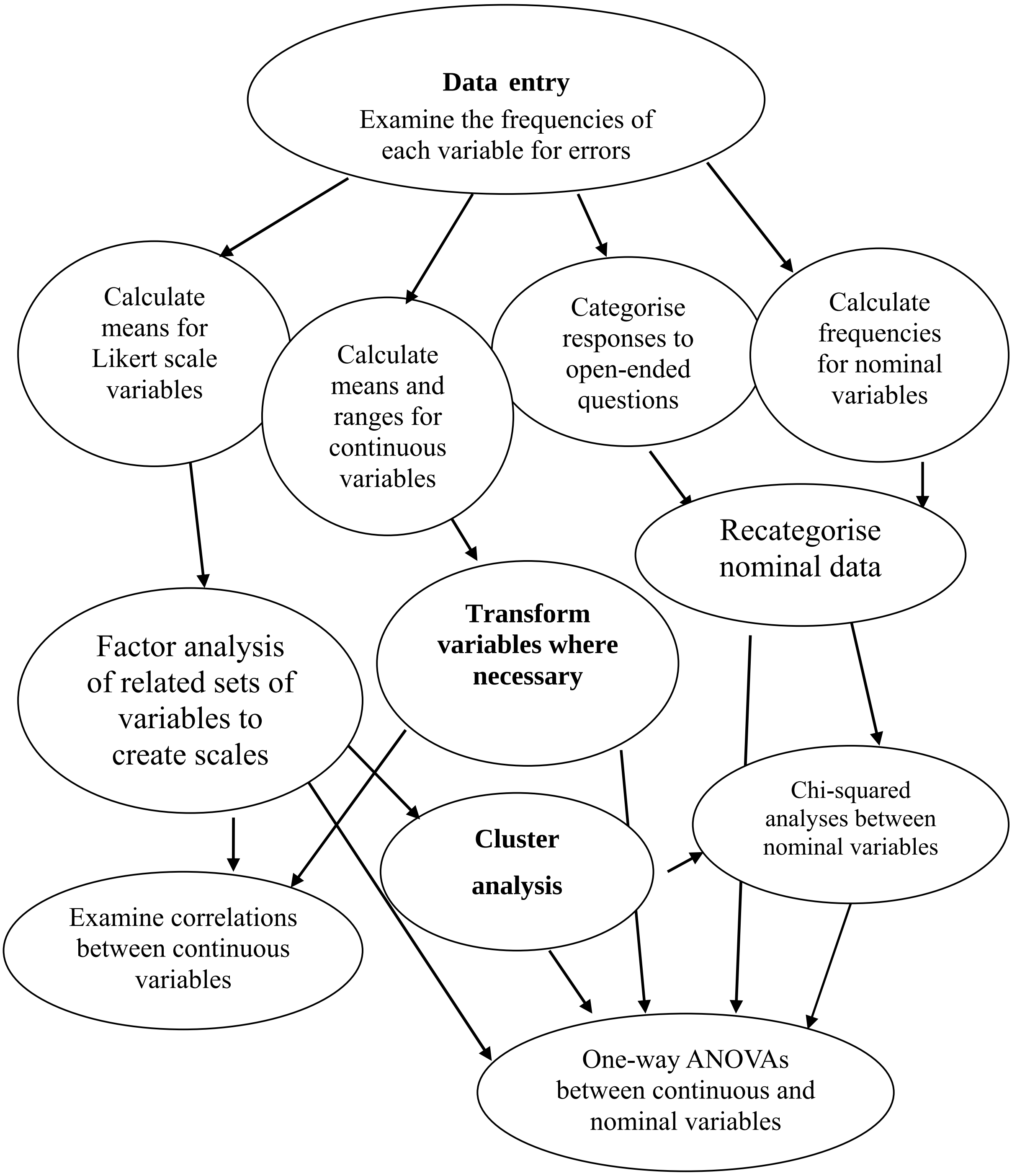

Figure5.2. Summary of the data analysis methodology used for the household survey data

Principal components analysis (PCA) was used to assist the description of responses to the survey, and reduce the number of variables included in testing of relationships between variables. PCA was applied to responses to questions about the importance of various reasons for and constraints to tree planting and management. The purpose of these analyses were to identify the factors underlying the responses, and to assess if scales could be reliably constructed that would reduce the number of variables involved in univariate and multivariate analyses.

5.4.4 Data Aggregation and Analyses

Once the responses to the household interviews had been checked and transformed, a series of statistical tests was used to identify the relationships between variables. In the first instance, descriptive statistics were calculated for variables relating to socioeconomic characteristics of the households, their tree planting and management behaviour, intentions and attitudes, and their development priorities. The focus of the data analyses undertaken for this thesis is at the household rather than the plot level. A set of summary variables was calculated for the households which participated in the interviews (Table 5.3). These variables are intended to summarise the level of resources available to the household, summarise their tree planting and management activities and summarise other demographic and socioeconomic characteristics of the household.

In the data analyses, the first series of tests were undertaken to compare the average socioeconomic and demographic characteristics of each of the communities involved in the survey. Next, the present and intended tree management behaviour of households in the various communities was compared, including the past and present use of materials from public lands. The differences between the communities in the priorities of households for various potential community development activities were also tested. The results of these tests are reported in Chapter 9.

The next series of analyses investigated the attitudes of households to tree management. The ratings of importance for each of the items in the topics ‘reasons for’ and ‘constraints to’ tree management were tested for differences between communities. Following these tests, principal components (factor) analysis was used to identify the factors underlying responses to items in these topics, and to assess if scales could be constructed. A set of two scales were computed for items in the topic ‘reasons for tree planting and management’ and four scales for items in the topic ‘constraints to tree planting and management’. Tests for relationships were undertaken between ratings of importance on these scales and the socioeconomic, demographic and behavioural variables included in the survey. The results of these tests are reported in Chapters 9 and 10.

Table 5.3. Variables computed for the household level analyses

Variable name	Variable type	Notes
Total household gross cash income per year	Continuous	Sum of incomes of all household members plus remittances to the household
Total income from farming	Continuous (log 10)	Sum of income from all farming activities including livestock sales
Proportion of income from farming	Continuous	Total income from farming divided by total household income
Average yearly total household income from remittances	Continuous	Sum of average yearly remittances to the household
Average cash income per household member (per capita)	Continuous	Total household gross yearly cash income divided by number of people in the household
If below regional rural poverty threshold	Yes/No	If household per capita income below official poverty threshold
Ratio of working adults to children	Continuous	Number of household members between the ages of 12 and 65 divided by the number of children in household
Ratio of labour to land size	Continuous	Number of household members between the ages of 12 and 65 divided by the size of land managed by the household
Total area of land managed by the household	Continuous (log 10)	Sum of the size of all farming parcels managed by the household
Total area and proportion of land used for farming that is owned by the household	Continuous (log 10)	Sum of the size of all farming parcels owned by the household
Types of crops grown by the household	Categories	Categories summarising all the crop types grown by the household
Area and proportion of moderate to steep sloping land managed by the household	Continuous (log 10)	Sum of the size of all farming parcels managed by the household that are moderate to steeply sloping
Total number of trees presently managed by the household	Continuous (log 10)	Sum of all trees presently managed by the household on all land parcels managed by them
Total number of trees intended to be harvested for timber	Continuous (log 10)	Sum of all trees managed by the h.old whose function is to provide timber for household use or sale
Total number of trees intended to be sold for timber	Continuous (log 10)	Sum of all trees managed by the household that are intended to be sold
If presently managing trees	Yes/no	If the household reported managing any trees on land they manage
If intend to plant trees	Yes/no	If the household reported an intention to establish any more trees on land they manage
Highest level of formal education in the household	Categorical	Categories summarising the highest level of formal education of all household members

Tests used to assess relationships between variables throughout the thesis include one-way ANOVAs for testing relationships between categorical and continuous variables; the chi square test for independence for assessing relationships between categorical variables; and assessment of correlations between continuous variables.

For one-way ANOVA tests, the null hypothesis is that the mean value of the continuous variable (mu) is equal for the categories defined in the categorical variables. This may be expressed as: H0: mu1 = mu2 = mu3 = mu(i), and the alternative hypothesis is h1: the mu(i) are not all equal. In the following section the results of these tests and the values for the categories with different ratings are described. Where the null hypothesis is rejected, tests for multiple comparison of means were used to identify the source of the differences in mean values.

For chi square tests, the null hypothesis applied is that the proportion of observations in each category of the first variable considered are equal to the proportion of observations in the categories of the second variable under consideration, and the alternative hypothesis is that the proportions are not equal. Where the null hypothesis is rejected the distribution of proportions are examined to assess the source of the differences.
Correlation tests assess the degree of linear association between the continuous variables. The null hypothesis in these tests is that the distributions of the variables are not associated, and the alternative hypothesis is that the distributions of the variables are associated.

In the majority of tests the 5% confidence level is used to assess if the null hypothesis should be rejected, that is where the significance of the tests is less than 0.05. In some cases a 10% confidence level is adopted where the analysis has not been covered in previous studies and the tests are exploratory (Hair et al. 1995).

5.4.5 Validation FGDs

Data collected from the initial focus group discussions (FGDs) were combined with the results of household interviews to construct separate reports for each of the four barangays. The reports were presented as a part of the validation FGDs to the communities and to representatives of the local government units present at these meetings. Those present at the meeting were invited by the barangay chairperson following requests from the survey team. During these meetings oral presentations of the main results of the survey were made, with summaries of the findings from the survey displayed using sets of manila paper. Discussions during these FGDs were recorded and used to confirm the accuracy of the data collected and the inferences drawn, plus generate insight into remaining ambiguities in the dataset.

5.4.6 Methods Used to Hold a Workshop about the Policy Implications of the Study

Although the validation FGDs provided feedback about the conclusions drawn by the study for the participants, they did not allow sufficient time or provide an appropriate venue for in-depth discussions of the policy implications of the research findings. It was decided, following discussions with staff from the College of Forestry at Leyte State University (LSU), to hold a policy workshop to discuss the implications of the research and the requirements for small scale forestry development. Those invited to the workshop included key informants from the four communities involved in the survey, representatives from the LGUs whose administrative area covers these communities, plus representatives from the National government departments responsible for land management (the Department of Environment and Natural Resources and Department of Agrarian Reform), and members of the College of Forestry of Leyte State University.

The workshop was held over one day at the College of Forestry building at LSU. The workshop activities commenced with a review of the findings from the household interviews and focus group discussions. The participants were then split into three groups to discuss the requirements for the development of small-scale forestry, focussing on the impacts of tree registration policies, and the implications of household tenure security on tree growing activities. The groups were formed to allow discussions for people in similar circumstances in relation to small-scale forestry, with the community representatives in the first group, the LGU representatives in the second, and the representatives from the DENR and DAR in a third group. The three groups then were asked to present their ideas to the whole workshop and these presentations were discussed.

Following the conclusion of the workshop, a summary report of the proceedings was developed. This report included a series of recommended policy reforms to aid the development of small-scale and community forestry in Leyte. The report has been distributed to people that participated in the workshop, with the aim of generating feedback about the proposed resolutions from the workshop.

5.5 ADDRESSING THE RESEARCH QUESTION

While some qualitative data was used to guide the survey, the bulk of information generated and analysed in this thesis was quantitative. There are a number of stages followed in the statistical analyses applied to the quantitative data generated by the household surveys to investigate smallholder typologies. These stages are depicted in Figure 5.2. The first step was to understand the data, through an exploration of the degree of variation between households in different communities in terms of their socioeconomic characteristics, and their tree management behaviour and intentions. The next level of analysis involved a series of univariate tests for relationships between socioeconomic and demographic variables, and those variables related to tree planting and management behaviour and intentions.

Following the creation of scales or indices of the importance of various reasons for and constraints to tree management, a typology of households in the communities was developed based on cluster analysis of responses to items in these scales. The types defined in the typology were then assessed for differences in socioeconomic characteristics and tree management behaviour and intentions. This provided further opportunity to assess the degree of variation in socioeconomic characteristics between households both between and within communities, and to assess the interrelationships between their socioeconomic characteristics, tree planting and management attitudes and land management behaviour.

To assist in obtaining robust results, i.e. results that reflect the 'natural' patterns of variation in the population and are repeatable, a combination of techniques were used to define the groups. Two stages of cluster analyses were applied in succession to take advantage of the strengths of the different techniques. Hierarchical techniques were applied to determine the number of groups of households to specify and to create 'seed points' for use in non-hierarchical or K-Means analyses. The choice of the number of types to define in the typology was made following examination of a number of possible solutions ranging from three to seven types. The assessment of the changes in the socioeconomic characteristics of the types as the number of types increased was undertaken to examine the loss in distinctiveness of the types as the number of them increased. The principle of maximising internal homogeneity of the types was balanced against the need to maintain sufficient observations in each type to allow statistical assessment of their characteristics, and the ease with which the typology could be described and utilised.

Several methods were used to validate the typology of rural households developed in this thesis. The characteristics of the types were compared with those that would be expected according to theories describing the socioeconomic factors affecting small-scale forestry practices and the results reported by previous studies on the same topic. Together with findings from previous research, the data analyses used to determine the socioeconomic factors that have significant relationships with tree management behaviour and intentions in the present study were also used to assess the predictive validity of the typology.

5.6 SUMMARY

The primary research question addressed by this thesis is to assess if it is possible to define a typology of rural households in Leyte Province in a manner that will assist the design and delivery of tree planting and management development programs. The approach adopted to address this question was mainly through the collection and analysis of quantitative data. The decision regarding what type of quantitative data to collect and how to interpret this data was aided by the collection of qualitative data, generated through workshops, focus group discussions, informal discussions with community members, development workers and researchers, and by carrying out a literature review.

Chapter 6

CURRENT APPROACHES USED TO GUIDE THE MANAGEMENT OF FOREST RESOURCES TO FACILITATE COMMUNITY DEVELOPMENT IN THE PHILIPPINES

Understanding the current forestry programs and industry, the context in which rural households operate, is vital to aid the design and interpretation of research into the social and economic factors affecting small-scale forestry development. This chapter reviews the existing social and community forestry programs in the Philippines, the leading programs for natural resource management and rural development in the country. In the first section, the current sources of supply of the Philippines timber industry are briefly described. Next, the major elements of the agreements that now come under the umbrella label of 'community forestry programs' are discussed. The third section of the chapter examines the stakeholders involved in community forestry programs, their potential roles, and the main constraints to their participation. In the final section the challenges facing community forestry programs are discussed.

6.1 SOURCES OF SUPPLY FOR THE PHILIPPINE TIMBER INDUSTRY

The Philippines present annual demand for timber and related construction products has been estimated at 5 M m^3 (UNFAO FMBDENR 2003). Guiang (2001b) estimated this to be presently met by the following sources:

- 12% from the harvest of residual forests (active timber license agreements and communities);
- 1% from plantation forest harvests;
- 16% from imports;
- 15% from the harvest of coconut trees; and
- 56% from 'substitutes' and maybe from 'illegal sources'.

Somewhat different estimates are provided by Carandang et al. (2000) who stated that approximately 25% of timber demand in the Philippines is sourced from timber concessionaires, 25% from industrial scale plantations, 30% from imports, and the remaining 20% from privately owned lands and from illegal or 'informal' sources. Some estimates are that the demand for timber products will grow by an average of 5% per year until 2015 (Forestry Masterplan 1990, cited in Carandang et al. 2000 p.1). It is estimated that the supply of timber will contract in the coming years due to three reasons. These reasons are (Carandang et al. 2000):

- The projected cancelling or non-renewal of all Timber Licence Agreements by 2011;
- Restrictions on the amount of coco-lumber entering the market, because of a lack of suitably mature coconut palms to harvest, and moves by the industry to protect and maintain current levels of production; and
- Restrictions on the export of log and timber product being enacted by other countries presently supplying the Philippine market.

Regardless of the exact proportions of timber being supplied by various sources, it appears that a major market exists for the sale of timber products that have been derived from unsanctioned harvests in remnant forests. There clearly are opportunities for communities and smallholder tree farmers to supply timber products into local markets, if they can meet the bureaucratic requirements for timber harvesting and transport.

6.2 CURRENT PHILIPPINES FORESTRY PROGRAMS

Philippine governments have been experimenting with social and community forestry programs for more than 30 years. While the first experiments with social forestry programs began in the early 1900s, it was not until shortly before the fall of the Marcos regime in 1986 that social and community-based forestry programs began their rapid rise to their current position as the leading forest land management program in the Philippines. The Philippines is recognised as a world leader in regard to their policies on community forestry, but reviewers of the programs have cautioned that many operational issues need to be addressed before these policies translate into sustainable community empowerment and development (Bisson et al. 1996, Johnson 1997, Guiang 2001b).

The Philippine national constitution of 1987 requires that natural resources can only be exploited or developed through joint ventures, co-management and co-production agreements between local communities and the government and private organisations. The Community Based Forest Management program was expanded in 1996 to become the '…the national strategy to achieve sustainable forestry and social justice' (Executive Order 263: Section 1).

It has become the 'flagship program' for community forestry, replacing the ISFP agreements and other people-orientated forestry programs (Tesoro 1999). There are 10 sub-programs under the Community-Based Forest Management (CBFM) program, including the Ancestral Domain program (Tesoro 1999).

The core objectives of the CBFM program are to democratise forest resource access, improve the socioeconomic welfare of upland communities, and promote the sustainability of upland resources (Pulhin 1998). The motto of the community forestry or people-orientated forestry programs is 'people first and sustainable forestry will follow' (DENR 1998).

There are three main types of agreements used in current community forestry programs to legitimise community forest management and give security of tenure to communities to utilise the resources in forest areas, as listed in (Table 6.1).

Table 6.1: Total area of public forest and forest lands covered by community forestry type agreements

Tenure instrument	No. issued	Area covered (M ha)
Certificate of Ancestral Domain Claims	181	2.546
Community based Forest Management Agreements	666	1.971
Certificates of Stewardship and Certificate of Forest Stewardship Agreements	442,124	0.815
Total area		5.332

Source: Guiang (2001b, p. 10-11).

The main types of instruments in terms of the areas covered are the Certificate of Ancestral Domain Claims (CADC) and Community Based Forest Management Agreements (CBFMA). In terms of the number of agreements, the main types are the Certificates of Stewardship and Certificates of Forest Stewardship issued under the Integrated Social Forestry Program (ISFP) because these were issued to individuals and households whereas the other agreements were issued to whole communities (La Vina 1999, Guiang 2001b). The CBFM agreements provide the communities with a guaranteed tenure over the land for a period of 25 years that is renewable for a further 25 years if the conditions of the program are met by the certificate holder. Certificate of Stewardship and Certificate of Forest Stewardship agreements that were issued under the Integrated Social Forestry Program were transferred to and replaced by CBFMAs in 1996 (Table 6.2).

Table 6.2: Types of community based forest management programs currently operating in the Philippines

Program name and commencement date	Type of tenure instrument used
Rehabilitation, protection and adoption of agroforestry in occupied public forestlands (1982)	Previously Certificates of Stewardship and Communal Forest Stewardship Agreements; now under Community Based Forest Management Agreements (CBFMAs)
Rehabilitation, protection and management of Fragmented Natural Forests by communities (1989)	Previously Community Forest Management Agreements; now CBFMAs.
Rehabilitation, protection and management of reforested areas by communities (1990)	Previously Forest Land Management Agreements (FLMAs), now CBFMAs
Protection and management of indigenous peoples claims – Alienable and disposable areas, public lands with or without forests (1993)	Certificate of Ancestral Domain Claims (CADC)
Rehabilitation, protection, improvement and management of natural forests by qualified organisations with the incorporation of communities in the overall management (1991)	Industrial Forest Management Agreement or Environmental Protection and Management Agreement
Protection and management of buffer and multiple use zones in protected area systems (2000)	CBFMAs

Another type of agreement is the Certificate of Ancestral Domain Claims offered to ‘tribal’ or ‘indigenous’ communities that have a long history of living and working in forest areas. These agreements give communities resource use rights, and unlike the other agreements they are not set to a limited time frame. The agreements were established following the passage of the *Indigenous Peoples’ Rights Act* in 1997. As shown in Table 6.1, these agreements cover half the forest areas under CBFMAs.

The Industrial Forest Management Agreements (IFMAs) or Environmental Protection and Management Agreements were also granted for a period of 25 years with the option to renew them for a further 25 years. No new IFMAs have been granted since 1995 when the program was stopped because of the perception of conflicts between these agreements and those issued under other community based programs.

6.2.1 Elements of Community Forestry Agreements

Most CBFMA areas are divided into a number of zones by management plans that provide different resource use rights for the community. These zones may include a ‘protection’ zone, where no harvesting of timber products is allowed but some non-timber products may be harvested sustainably; a ‘limited use’ zone that buffers the protection zone where some portion of the timber may be harvested; and a ‘production’ zone where timber harvesting is permitted.

Poverty and lack of employment opportunities are recognised as major impediments to the protection of remaining natural and residual forests (DENR 1990). The community forestry programs aim to build the capacity of communities to establish sustainable enterprises and the programs usually involve some ‘livelihood’ component that aims to provide participants with some form of immediate income.

While individual households could take up Certificate of Stewardship agreements over small land parcels, the majority of agreements have required that the community establish or adapt a community or peoples’ organisation to be eligible for an agreement. In some cases the communities already have cooperatives for buying or marketing or processing agricultural produce and these organisations can then register as a people’s organisation to apply for a CBFMA. Where the agreements cover cleared land, the people’s organisation is usually contracted to plant the area under the agreement. This provides the community organisation with a source of funds that can be paid to members involved in the planting activities, or used to build-up funds for the organisation for later investment in forestry or non-forestry livelihood projects. Examples of non-forestry community investments include fishponds, health service infrastructure, market access improvement, and agricultural produce processing equipment. Another way that CBFM projects provide income from limited production zones and protection zones is through the harvest of non-timber forest products. Common examples are the under-planting of rattan and abaca (Manila hemp) species in reforested areas or remnant forests, species that can be harvested for use in furniture manufacture or fibre production without removing any tree species.

The community organisation and partner (usually the DENR) sign a profit-sharing agreement to cover the distribution of revenues from harvests. The DENR usually provides the planting materials (or technical knowledge for nursery development) and funding for the maintenance of plantings. The DENR has utilised grants and loans from international lending and aid institutions to fund the CBFM program including the World Bank and the Asian Development Bank.

An integral part of the CBFMAs is the use of community organisers. These people are employed to help establish and maintain community organisations. They are critical in assisting the community organisations to comply with the contracts they enter under the agreements. Their role includes facilitating the election of officials for the community organisation, and providing advice about the preparation of the plans and applications for permits required to establish and later harvest planted areas. In some cases the community organiser is provided by DENR. In other cases the community organiser is contracted from an NGO or is employed by the Local Government Unit.

6.3 STAKEHOLDER ROLES IN COMMUNITY FORESTRY PROGRAMS

There are a number of actors or stakeholders involved in community forestry programs in the Philippines. These various groups, their potential roles in community forestry programs and examples of institutions are summarised in Table 6.3. At the centre of the community-based forestry programs is the community organisations or ‘people’s organisations’. Their role and those of the other stakeholders are examined in the following sections.

Table 6.3: Stakeholders involved in community forestry programs in the Philippines, their roles and examples of existing institutions

Stakeholder	**Roles**	***Institutions***
Community members or households, community organisations	- beneficiaries - labour providers - holders of 'local knowledge' - land and forest management - community development	Peoples organisations Community organisations
Department of Environment and Natural Resources	- provision of information and capital - land management regulation - community development	Department of Environment and Natural Resources national and provincial offices
Other national government departments	- land management regulation - provision of information - land management	Department of Agriculture, the Department of Agrarian Reform
Local Government Units	- land management regulation - provision of information and capital - community development - infrastructure development	Local (municipal) governments
Non-Government Organisations	- provision of information - development of sustainable land management systems - community capacity building - legal and political advocacy for communities	> 5,000 registered NGOs in the Philippines
Aid agencies	- capital - provision of information - advocacy for institutional reforms	World Bank, Asian Development Bank, USAID, Ford Foundation, FAO
Timber industry	- markets for timber products - provision of information - capital for plantation establishment and maintenance	
Universities	- analysis of programs - provision of information on all aspects of programs - development of sustainable land management systems	University of the Philippines Los Baneos, Leyte State University, Ateneo de Manila IPC, de la Salle University and others
NGO Research agencies	- provision of information - development of sustainable land management systems	Foundation Centre Incorporated, Mindinao Baptist Rural Life Centre and others
International research bodies	- provision of information - analysis of programs - development of sustainable land management systems	ACIAR, CIFOR, GTZ, ICRAF, SEARCA and others

6.3.1 The Role of Community Organisations

Communities are required to form community organisations to be eligible to enter into a CBFMA and gain access to the CBFM program supports. The functions of the community organisations are to:

- provide a legal entity that can enter into contracts with partners;
- provide a point of entry to communities for the provision of training and funds;

- provide a forum for the resolution of disputes within the community;
- ensure equitable sharing of resources within the community following the signing of a CBFMA; and
- provide community members with experience in organisational, financial and enterprise management.

The difficulties involved in ensuring that communities form and maintain community organisations is well recognised by those who have designed the community forestry programs. Community groups are potentially the weakest link in the CBFM program with the success of community forestry dependent on building a community's capacity to develop and manage a collective resource (Bisson et al. 1997, Pulhin 1998, Donoghue 1999, La Vina 1999, Guiang 2001a and b). Many of the communities involved in the CBRMP have low literacy levels, lack financial resources and do not have a history of utilising resources in a collective manner (Donoghue 1999). Community organisers contracted from 'assisting organisations' are a standard part of CBFM projects. Some sub-programs of the CBFMP use community organisers from NGOs, the USAID funded Natural Resource Management Projects (NRMP), while others use DENR or LGU personnel.

Early community forestry schemes were criticised for not paying enough attention to the formation of community groups or community capacity building (UNAC 1992). Community organising is expensive and time consuming. The pilot contracts for the CBFMP initially employed community organisers for from three years but in 1996 this was reduced to one year with the possibility of renewal (Donoghue 1999). The present contract terms for community organisers are for two years (Estoria 2004).

One factor that has been identified as restricting the success of CBFMAs and other community forestry programs elsewhere is the failure of many assisting organisations to take account of the diversity of socioeconomic circumstances within communities (Raintree 1987, 1991, Pulhin 1998, Bisson *et al*. 1997, Donoghue 1999, Contreras 2000). Pulhin (1998, p. 5) quotes Cernea (1992) as stating:

> Entrusting a social forestry program (and development programs in general) to the wrong social actor will lead to the failure of the program, as in fact has happened repeatedly….Some statements or articles are repeating the term *community forestry* from title to end hundreds of times as mantra, without once bothering to discuss what specific social groups, strata, or classes compose this mythical "community"…it

is necessary to desegregate the broad term *people* and identify precisely which unit of social organisation can do afforestation, and which social units and definable groups can act as sustaining and enduring social structures for long-term production activities.

Pulhin (1998, p.5) went on to comment that:

…some CBFM projects in the Philippines would show that both the DENR field personnel and NGO's oftentimes regard the community as a homogenous grouping with similar interest. There is little if any conscious effort exerted on the identification of the different interest groups, including those whose source of livelihood are mainly dependent on the local forest resources. This has contributed to the perpetuation and reproduction of inequity in terms of access to forest benefits in favor of the local elite.

Bisson et al. (1997), in reviewing the experiences of the USAID in over 100 CBFMAs, concluded that '(a)ssumptions about the heterogeneity of community interests, and therefore their unity of purpose and willingness to organise, did not hold true.' These authors then recommended to those involved in community forestry programs in the Philippines that they '…(d)o not attempt to force an organisation where none exists. The time required to organise communities of people with heterogeneous interests should be measured in years, not weeks' (Bisson et al. 1997, p. 25).

For community organisations to be sustainable they need to be assured of dependable incomes to finance their activities and sustain community interest (Guiang 2001b). The community forestry programs have not yet achieved this. Initial community forestry programs focussed on the reforestation of cleared lands with communities not given access to residual forest resources until the mid 1990s. Communities gained income through contracts to plant areas but they frequently had to wait long periods for payment. This meant some ended up worse-off than before because they had neglected other farming activities (Donoghue 1999). Communities without access to residual forests have few resources to use for development activities (Guiang 2001b).

Community organisations are required to submit plans of their proposed works before planting areas as well as obtain harvesting permits and transport permits if they wish to remove or harvest any trees. Revision of plans also requires DENR approval (Donoghue 1999). The process to obtain these permits is time consuming and complex, requiring knowledge of how to carry out timber inventories and harvesting plans as well as knowledge about how to deal with bureaucracies and legal commitments that are new to many community members. The time taken to have work and site plans approved for the pilot sites of the CBFMP was on average four years, even with assistance the of NGOs, the DENR and others (Donoghue 1999). Although the processes required for approval of community forestry programs were simplified in 1996 (Donoghue 1999), the procedures are still too complex for most community organisations (Guiang 2001b).

6.3.2 The Role of Non-Government Organisations

Non-government organisations or NGOs can potentially act in three roles as part of the CBFM program. These are 1) undertaking research and development of livelihood projects; 2) being legal and political advocates for communities; and 3) as assistance providers, providing community organisers, planting materials and alternative livelihood support. The types of assistance that contract NGOs can provide to communities can be broken down to three categories as well: service delivery, participatory methods and group capacity building (Quesblatin 1994, Donoghue 1999).

As research and development organisations, NGOs such as the Mindanao Baptist Rural Life Centre have developed alternative and sustainable farming systems for upland farmers. The Sloping Land Agricultural Technology system or SALT was one of the main technologies promoted to farmers in the ISFP in the 1980s (Watson and Laquihon 1986). The Ford Foundation is another NGO that has made investments into developing sustainable upland farming practices and innovative, multi-disciplinary approaches for working with farmers (Ford Foundation 1998).

The provision of services to communities, particularly acting as community organisers or running nurseries to distribute seedlings to farmers and communities, are vital parts of the CBFM program, and the input of NGOs is highly valued by communities and other participants (Nixon et al. 2001). The upland communities are often termed ‘the poorest of the poor’ in the Philippines. Considerable dedication and commitment is required of community organisers to work in these communities for years when most communities lack basic services and are isolated by both distance and poor roads from towns and services.

The NGOs also have a vital role to play as advocates for upland communities trying to protect their landholdings and forest areas from illegal logging activities and locally powerful interests who occasionally lay claim to their resources. In one community met by members of the ACIAR/Leyte Smallholder Forestry project, community members had reported 17 cases of illegal logging to DENR in their CBFMA area but none of these incidents were pursued by the DENR. On the 18th occasion, the community enlisted the support of a legal advocacy NGO and was able to follow the case through three court hearings, without DENR support, to the point where it became the first time a community organisation had successfully prosecuted illegal loggers.

There are thousands of NGOs in the Philippines and networking is seen as a way for disparate organisations to improve their impact on development activities. Quesblatin (1994) estimated that 3,000 of the approximately 20,000 Philippine NGOs and POs are members of 10 main networks. The 10 networks combined to form an umbrella organisation called the Caucus of Development NGO Network (CODE-NGO) in 1991. The umbrella organisation was established to have a greater impact on development, to avoid having to set-up a ‘mega’ NGO, and avoid trying to organise groups with widely varying philosophical leanings (Quesblatin 1994, p. 6). It was also established to: prevent undue ‘cooption’ by government; safeguard the security of NGO workers; optimise the sharing of talents, skills and lessons; experiment with new development approaches; strengthen regional alliances; create successor generations of leaders, and achieve more effective advocacy (Quesblatin 1994 p. 6, citing Constantino-David 1991).

The Upland NGO Assistance Committee is a peak body of upland development NGOs that works to monitor the activities of NGOs working on projects in upland areas. This body provides training for NGO staff and makes recommendations about the modification of programs to national government agencies, as well as international aid and lending institutions, to improve their development projects (del Castillo 1992, Quesblatin 1994). The Upland NGO Assistance Committee has recognised and accredited some NGOs as capable of providing community capacity building services. Such accreditation is important to overcome the possibility of NGOs being set up by corrupt officials to ‘milk’ development funding with no intentions of fulfilling all their obligations. The Upland Development Working Group (UDWG) is an early example of a NGO/university/DENR body that had an important influence on the direction of community forestry in the Philippines in the 1980s (Quesblatin 1994). Other NGO networks include Asia-wide Consortium on Peoples Participation in Environmentally Sustainable Development (SEACON).

More recently a series of groups have been formed that are similar to the UDWG which was established to guide the Integrated Social Forestry Program. These are the Regional Distillation Groups that aim to bring together local DENR officials and NGOs quarterly to discuss and troubleshoot local issues. Recurrent issues are sent to the DENR head office for assessment. The South East Asian Sustainable Forest Management Network (SEA-SFMN), is another group linking R&D organisations in four South East Asian countries, coordinated by the Centre for South East Asian studies at the Berkeley campus of the University of California (Quesblatin 1994, p. 16).

At present the most powerful interaction for creating policy reforms between Philippine NGOs and the government is through the Presidential Council for Sustainable Development, which has members drawn from NGOs as well as cabinet officials. In 1994, 17 NGOs combined to form the NGOs for Integrated Protected Areas (NIPA). This group accessed funding from the World Bank administered Global Environment Fund to establish the first ten Integrated Protected Areas in the country (Quesblatin 1994).

6.3.3 The Role of International Aid and Lending Agencies

Funding from large aid and lending agencies including the Asian Development Bank, USAID, GTZ and the Ford Foundation have played a large part in the development of the CBFM program. As described in Chapter 2, most rural Filipinos are still dependent on agricultural production and have few opportunities to take up work in non-agricultural industries (de los Angeles 2000). Successive national governments from the 1940s to the 1980s relied on the wealth of natural resources and the 'Green revolution' of agriculture, failing to develop a strong industrial base that could potentially support the population. Philippine governments have the legal power to enter agreements that give management of upland areas to the local communities, but they do not have the funding to pay for the community capacity building and support for tree establishment that is required to ensure that the land and forest areas managed by the communities are developed in a sustainable manner. Tesoro (1999) discussed the major challenges facing the Philippines as the lending agencies that have funded a large proportion of the CBFM programs are coming to the end of their funding commitments. Similarly, Pulhin (1998) noted that the DENR Community Forestry Program Office has expressed concern that 'the enormous financial and technical assistance given to foreign–funded community-based projects make them non-replicable and thus not sustainable'

(National CFP Coordinating Office 1996, p. 289, cited in Pulhin 1998, p. 9).

Roles of the funding agencies have been to supply capital to run reforestation programs, to provide expert analysis or capital for employing experts to analyse the success of programs and to provide analysis of institutional arrangements affecting forestry and reforestation activities. In some cases the loan and development agencies have used the funding of programs to persuade the national government to reform agencies, as happened with the Asian Development Bank (ADB) support for reforestation projects in the early 1990s. The funding from the ADB was dependent on the preparation of a Master Plan for Forestry, which was in turn funded by the Finnish Government (Teroso 1999). It is argued in the Revised Master Plan for Forestry (UNFAO FMBDENR 2003) that international donor organisations have failed to coordinate their efforts, or adequately consider the institutional capacity of the DENR when designing and administering programs. It is unrealistic to expect the DENR organisation to be able to revegetate a larger area in ten years than had occurred in the previous century.

Most of the funding agencies provide capital with conditions attached so that the programs run using those funds are all slightly different from each other. While it is useful to have a variety of approaches for experimentation, there can be negative consequences. The variation in programs can have the effect of confusing DENR staff and communities, particularly when, for example, one program may support wages for communities to revegetate an area whilst a neighbouring community under a separate program does not receive the same funding (Tesoro 1999 p. 18). Part of the problem is that the sub-programs are run from different offices and integration of the programs under the CBFM program by the DENR has not occurred (UNFAO FMBDENR 2003).

Utting (2000) argues that the widespread failure to succeed in empowering communities is partly due to the agenda of international donors which direct the policies of the national government. These policies, Utting argues, have resulted in the commercialisation of community organising, with contracts specifying unrealistic time limits for an activity that is not predictable.

6.3.4 The Role of the Department of Environment and Natural Resources

The Department of Environment and Natural Resources (DENR) is the main national government agency responsible for the management of the forestlands in the Philippines. The department was formed in 1987 to bring natural resource management in line with the new constitution, taking over management of forestland from the Bureau of Forest Development (Guiang 2001a). The DENR manages all the programs under the CBFM program except the Low Income Upland Community Program (LIUCP) and Regional Resources Management Program (RRMP), which are regionally-based programs, and the Integrated Social Forestry Program (ISFP) which, apart from the maintenance of single demonstration sites in each province by DENR, are under management of the LGUs.

The DENR plays a number of roles in the community forestry program. They are the primary agency responsible for the equitable and sustainable management of forestlands. The Forest Management Bureau within the DENR has primary responsibility for the management of the most of the 15 M ha of classified forestland, 50% of the nations land area. As such they are responsible for reviewing the site plans and annual work plans of CBFMP participants and providing information and training about revegetation and timber production techniques. They are also a partner in many of the CBFMAs, having signed production sharing agreements with communities. DENR has the responsibility of resolving conflicting forestland claims, for example between indigenous and migrant groups or between private industries and communities (La Vina 1999). They are also mandated to play the role of a facilitator for developing partnerships between communities, private companies and local governments. In some cases the DENR provides support staff who act as the community organisers for projects.

The majority of ISFP sites were devolved to the Local Government Units in 1992 as a part of a broader move to decentralise power and control of political processes from national to local government agencies (La Vina 1999). The DENR retained control of the ISFP pilot sites in each province to serve as training centres for other projects. The DENR is still the primary agency in charge of forest management with the Local Government Units (LGUs) working as secondary agencies in terms of natural resources management. Policies are in place to transfer greater responsibility for community forestry to the LGUs, with the DENRs' role now to train the LGUs for this responsibility and oversee the LGU operations to ensure they are consistent with national and regional policies (La Vina 1999).

Following reorganisation of the agency in 1987 the DENR took responsibility for the management of forests and also a responsibility as a development agency for people living in upland areas. The DENR staff in forestry mostly came from the former Bureau of Forest Development, the agency that had administered the Timber License Agreements. The changing paradigm of forest management in the Philippines greatly affected both the administrators and the field staff in the department. They were no longer dealing with commercial timber operations of a small number of large companies, but with a large number of small communities and families. Their relationship with the upland communities was totally reversed from having the responsibility of stopping these communities from illegal kaingin farming, to the responsibility of assisting in community development. These changes take time to settle and require the retraining of DENR staff to adapt to their new position as a 'change agent' rather than a 'controller' (Pulhin 1998, Tesoro 1999). Some communities still fear the involvement of the DENR staff in their lives remembering their role as forest police (Bisson et al. 1997, Tesoro 1999).

Another leftover from the management of large Timber License Agreements (TLAs) is that the DENR still requires virtually the same paperwork from communities wishing to undertake forestry activities as they had from the TLA companies. These requirements have been criticised by reviewers of the programs on the grounds that they are too expensive, complex and time consuming for the small operations of communities (Bisson et al 1997, Pulhin 1998, Tesoro 1999, Guiang 2001). The insistence on detailed site plans and timber inventories for CBFMA areas, whilst neglecting to ensure community capacity building occurs, is thought by some to indicative of the DENR failure to reset their focus from commercial timber production to community development (Pulhin 1998, Donoghue 1999).

Some researchers have emphasised that the DENR field staff suffers low morale from a combination of reasons, including their changed responsibilities, a lack of specific training, a lack of funding to support their tasks, and the lack of a clear career path in community forestry (Bisson *et al*. 1997, Pulhin 1999, Guiang 2001). As described earlier, it is not uncommon for DENR community forestry staff to lack funding to pay for public transport to visit the communities they are meant to support (Bisson et al. 1997, UNFAO FMBDENR 2003). The approaches used by the DENR have changed on numerous occasions in the 1980s and 1990s, from pro-logging orientation to strict control on commercial logging, to community forestry programs supported by the national government, then to devolution of responsibilities to LGUs (Utting 2000, p. 201). These changes contribute to the low morale in the organisation as well.

The provision of a stable regulatory environment is also part of DENR's role in the development of community forestry (Upland NGO Assistance Committee 1992, Hyde et al. 1996, Teroso 1999). The stability of policies in relation to forestry has been mentioned as an on-going problem for forestry development. One example is when the Secretary of the DENR placed a ban on processing logging applications from CBFM areas in 1998 (Teroso 1999). The changing of regulations meant considerable hardship for some communities that had invested in small sawmills or had otherwise relied on income from timber processing and sales (Teroso 1999). The regulations surrounding the awarding of contracts and other requirements by the DENR have also changed frequently over the last 15 years (Upland NGO Assistance Committee 1992, Hyde et al. 1996, La Vina 1999). It should be noted that the failure to provide a stable policy and regulatory environment for forestry development ultimately rests with the National Government. Successive administrations have failed to pass legislation that would remove the inconsistencies and omissions of the current forest management legislation.

Another problem that has been encountered is the delay of payments of money earned by communities from revegetation contracts (Bisson et al 1997, Teroso 1999, Upland NGO Assistance Committee 1992). Like the changing of regulations this reduces communities and the forest industry's trust in the DENR and the viability of forestry development. The role of the DENR as a facilitator of community forestry programs continues to confuse local communities who still see regulation of forestry as their primary function. Having watched operators of timber concessions flout the regulation of logging practices, including the bribing of corrupt officials for years, many of the forest-based communities do not trust the DENR. In other cases their trust has been undermined by more recent experiences in trying to get the DENR to take action over illegal logging.

In one municipality of Leyte, the local community forestry organiser stated that the distance of municipality from the regional centre of Tacloban is limiting the flow of information and resources. The organiser was of the opinion that DENR had put far too little effort into ensuring that local communities understood the new regulations relating to tree planting and harvesting. He and others have stated that stories of people who had been jailed for illegal logging were better known in these communities than knowledge of how to register planted trees so as to allow later harvests.

6.3.5 The Role of Local Government Units

The administrative areas of Local Government Units (LGUs) are the municipalities of the Philippines which, in rural areas, usually cover a number of barangays. Their responsibility for forest and natural resource management has been increased in the past 10 years in an effort to decentralise power in the Philippines, to allow local self-determination, and facilitate the use of local knowledge to treat local problems and issues. The LGUs have gained increased responsibility for environmental management but their activities are still subject to approval of the DENR who retain primary responsibility for ensuring that natural resources are sustainably managed (Lu 1998, La Vina 1999). The LGUs are expected to initiate CBFMAs, support CBFMAs financially and technically, incorporate CBFMAs into local land use planning schemes, maintain protected areas, and catch and charge those who violate forest protection laws (La Vina 1999). Some DENR staff have been transferred to LGUs to provide support for community forestry programs. Unfortunately, the increased responsibilities of LGUs have not been matched by increased budgetary allocations. The LGUs ability to draft their own policies is strictly limited, and the DENR still retains control over key decisions such as the issuance of harvesting permits (Lu 1998, La Vina 1999).

LGUs are supposed to be consulted in the preparation of applications for CBFMAs. They have the responsibility to check the boundaries of proposed areas and recommend areas for agreements to the DENR. The lack of tenure mapping in many areas and boundary markers for national parks, forest reserves and wildlife sanctuaries increases the difficulties of this task (de los Angeles 2000). They also have a role to play in developing partnerships between communities and private industries (Guiang 2001b).

The LGUs in rural areas employ Municipal Agricultural Officers whose role is to provide extension to farmers. These officers in some areas also provide advice to communities about community forestry programs.

6.3.6 The Role of Research Organisations in Community Forestry Programs

A variety of international and national research institutions have helped to develop community forestry in the Philippines. Their roles have been to train forestry professionals in social and community forestry practices, provide analysis of existing and potential programs, trial forestry programs in various communities, and act as advocates for the development of community forestry. International research agencies that have been active in the Philippines include the World Agroforestry Centre (formerly known as the International Centre for Agroforestry Research, ICRAF), and the Centre for International Forestry Research (CIFOR). Researchers have been employed by funding agencies including the World Bank, the Ford Foundation and USAID to analyse the operations of community forestry programs (La 1999 Bisson et al 1997, Johnson 1997, Guiang 2001a). University based researchers were members of the Upland Development Working Group that was formed in the early 1980s to recommend means to establish what became the ISFP. This group later acted as an important forum for discussion and development of later community forestry programs. Together with NGOs, the actions of Philippine researchers in developing and trailing social and community forestry projects in the 1970s provided a basis for the later development of national programs (Cuevas 1979, Aguilar 1982, Aguilar 1986, Mariano 1986, Borlagdan 1987, Gonzal 1988).

The first forestry school in the Philippines was established in Los Baños in 1910 by the American administration concerned about the sustainability of forestry operations. This school is now part of the University of the Philippines and the campus at Los Baños has grown to become the largest agricultural university in the Philippines. The forestry school has a Department of Social and Community Forestry which, since the 1970s, has provided researchers to analyse social and community forestry programs, and provided policy advice to decision makers. In 1996 there were 37 tertiary level forestry schools in the Philippine (Lu 1998). Other institutions that have had a major impact on the development of community forestry in the Philippines include the Institute for Philippine Culture at Ateneo de Manila University, and researchers from De Salle University, also in Manila.

Researchers from all organisations have constantly stressed the need to focus on community empowerment and participatory methods rather than silvicultural practices as the key to developing successful community forestry (Cuevas 1979, Aguilar 1982, Gonzal 1988, Cernea 1992).

6.3.7 The Role of Industry Groups in Community Forestry Programs

The CBFM program allows that natural resources can be sustainably developed or exploited by the community in a partnership with governments or private industry. Private industry has the capacity to assist communities greatly in terms of silvicultural and processing knowledge, plus access to markets and finances. It is the role of DENR and LGUs to facilitate relationships between community groups and private organisations.

In the past, the Industrial Forestry Management Program was used to facilitate the establishment and management of large-scale timber plantations. The cancellation of the Industrial Forestry Management Program stemmed from difficulties in financing the agreements and conflicts of interest between community groups and private companies over access to forest areas (La Vina 1999). Some industry spokespeople argue that the continual rewriting of forest management regulations has seriously affected the willingness of private industry to invest in Philippines forestry (Lu 1998). Like the spokespeople for the community groups involved in forestry activities, the industry groups argue that the current administrative requirements for timber harvesting are too complex and subject to delays to allow private investors to undertake investments (Lu 1998).

6.4 CONSTRAINTS TO THE SUCCESS OF COMMUNITY FORESTRY PROGRAMS AND SMALL-SCALE FORESTRY ACTIVITIES

From their analysis of six case studies of agricultural development projects, Sajise et al. (1996) listed five factors that are critical to the success of the projects. Only one of these factors relates to hardships posed by the biophysical environment in which community forestry development occurs. The other factors all relate to social and economic issues and they include:

a) the kind of technology employed;
b) socio-cultural factors, including tenurial arrangements, institutions like community organisations, and population pressure;
c) economic considerations;
d) the nature and quality of the ecological resource base plus the effect of global weather phenomena such as El Nino patterns and global warming; and
e) higher level institutional factors, including national government policies in relation to agriculture and forestry, world trade agreements, and the rates of tropical deforestation in other countries.

One fundamental economic problem facing those who wish to control illegal logging activities is that the costs of compliance for 'legally' harvested result in these products being more expensive than the illegally sourced products (Hyde et al. 1996). This and other economic considerations appear to cause major constraints to the success of small-scale and community forestry programs. The provision of stable sources of livelihoods is a prerequisite for the success of forestry programs in rural areas where more than half the households are below the official poverty line. Unfortunately, the rural communities are not alone in their budgetary constraints, with many of the government organisations that are mandated to support rural communities also suffering from a lack of funds to carry out their work.

The budgets to support administrative functions of local, regional and national government programs are small and the infrastructure on which they base their work is under developed. In 1998 only half the country had been covered by cadastral surveys, a factor rated as the 'most severe bottleneck to improving the allocation and management of land resources' in the Philippines by de los Angeles (1999, p. 6). The DENR and many local government units are unable to fund community forestry development programs and to address the issues listed above.

One proposed solution is to allow sustainable logging of remaining native forests to provide immediate returns to communities and capital to invest in further tree planting activities. Reviewers of community-based forestry programs in the Philippines have defined four basic types of land that are covered by community forest management agreements, each of which have different management requirements and opportunities for short-term resource utilisation by communities (Various 1996). These types are:

- richly endowed native forest that can provide adequate livelihood for the community through the harvesting of non-timber forest products (NTFPs);
- remnant forest with less richness of resources that requires some timber harvesting for adequate livelihood provision;
- degraded forest that requires some reforestation; and
- grassland that requires reforestation.

It is argued that the two final types of forests are those that require large investment that may be best sourced from the private sector (Various 1996).

The deforestation of the Philippines led to the restructuring of forest management including the cancellation of many TLAs and awarding of management rights to millions of hectares of forest or ex-forest land. The communities were not granted access to the rich dipterocarp forests that had been the source of wealth for the timber concession holders in the 1970s however. Most of the accessible forest areas had been logged over by the end of the 1970s. Early programs such as the Integrated Social Forestry Program were criticised because they only covered denuded areas that were expensive to replant which was a condition of the agreements (UNAC 1992, Guiang 2001b). It was not until 1996 that communities were granted user rights over areas that retained some forest cover. Since then the conditions applied by the DENR for timber harvesting have limited many communities' ability to generate short-term incomes. These Resource Use Permits have been unilaterally cancelled on two occasions by the DENR due to the excessive use of resources by some organisations. This effectively punishes all the organisations for the bad behaviour of a few, further degenerating confidence in the stability of the regulations applying to forestry activities (UNFAO FMBDENR 2003).

The importance of the lack of capital as a constraint to small-scale and community forestry development is emphasised by studies of the potential financial returns to timber plantations in the Philippines that consistently report that timber plantations can be highly profitable. A review of the operations of existing private land tree plantations by Carandang et al. 2000 concluded that they could be profitable with internal rates of return (IRRs) of between 18% and 45% for popular species including Gmelina, Mangium, Bagras and Mahogany. Similar potential rates of return for these species are reported by Venn et al. (2000a). One problem is that many farmers are not familiar with the principles of long-term financial analyses and commonly employed measures of financial return such as NPVs and IRRs, and another is that such information about financial returns is not available to farmers (Venn et al. 2000b). Even if farmers decide that they do wish to invest in tree establishment with the view of producing timber for sale, credit access in rural areas is reported to be limited, and where available, expensive, and restricted to periods of two to three years (Venn et al. 2000b).

The financial constraints to commercial timber production by small-scale farmers relate primarily to the tree establishment phase of plantations, although further financial uncertainties confront small-scale farmers who wish to engage in timber production because of the unstable political administration of forestry (i.e. sovereign risks), and conflicting land management strategies. Households that are below or near the poverty threshold are forced to adopt risk management strategies to avert the potential of financial or environmental crises that can critically affect their well-being. As described above government decisions to ban logging in community forestry areas caused serious disruption to community groups whom had tied up their capital with investments in log processing equipment. Many farmers do not own the land they till, and under tenancy arrangements are not free to choose the crops they grow, but rather have to grow the crops specified by the landowner.

Crop protection is also a serious issue for many small-scale farmers. The farmers' ability to protect their investments in tree crops is not just limited to the potential problem of losing their tenancy and thereby the tree when they become mature for harvest. It is further eroded by the potential for conflicts with neighbouring farmers who may fail to control livestock that can damage growing trees, or the possibility of fire damaging standing trees as graziers commonly use fire to promote the growth of grass species in areas dominated by cogon grasses.

Before the trees can be harvested landholders are supposed to obtain a harvest permit from DENR offices. The provision of these permits is frequently delayed and provides another uncertainty to the process of growing trees for sale as timber. Once the trees have been successfully harvested there are still issues related to the transport and marketing of trees that can affect the profitability of timber production. Permits must be obtained from the DENR to transport timber between local government areas. Again these permits are frequently delayed, either due to deficiencies in the resources available to process them, or due to 'rent seeking' behaviour of officials seeking bribes to provide the documentation. The issue of rent seeking is also reported to be prevalent in connection to the operation of the road control points that monitor timber transport between LGUs (Herbohn et al. 2004). To make matters worse, traffic control points and demands for extra payments are not restricted to official DENR checkpoints, with reports that other groups including militia groups, NGOs and even church organisations set up their own checkpoints to extort money from timber transporters (Venn et al. 2000b).

The problem of corruption and tolerance of illegal activities is widespread in the Philippines and is seen as official policy by people on-the-ground. Forestry policy in the Philippines is still effectively based on PD 705, issued in 1975, which has been modified on numerous occasions. There is a need to reformulate forest policy to make it internally consistent and operational. As observed in the Revised Master Plan for Forestry (UNFAO FMB 2003, p. 148):

> The forestry related policy and institutions/instruments in Philippines have not been stable, characterized by frequent changes. What is written as policy is meant to be practiced; and policies are to be changed only for very valid reasons. Moreover, policy, for a common person, is what is practiced, not what is written on a paper. If policies as written are not practiced, then by reflection what is practiced becomes policy. That is how in many situations/ countries the "real" policy is one of tolerating illegal activities and corruption, not in forestry alone, but in most sectors.
>
> Therefore, there is no point in saying that "the policies are good, but the problem is in poor implementation". Institutional efficiency is in practicing what is preached.
>
> Organisational structure and mission, legal instruments (rules and regulations) and plans and programmes are strategic elements in implementing a policy. When these elements fail to achieve the policy objectives, the clear indications, often, are that these strategic elements need changes (modification, re-orientation or replacement). There may also be the need to change, clarify and/or re-iterate the policies. That seems to be the situation, now in the Philippines.

The DENR has been criticised for the manner in which they administer their duties. This said, it should also be recognised that the DENR is responsible administering the policies of administration in charge of the national government, and their position on forestry has fluctuated greatly since 1987 (Utting 2000). It is difficult for an organisation to have to continually reorientate their programs to make operational the frequent changes to forest and land management regulations by national government administrations.

As Guiang (2001b, p.44) concluded, the ideas behind the CBFM program are good in theory, but this is not good enough, as observed by UNFAO FMBDENR (2003) above. There remain many issues to be dealt with in practice. He said:

> almost a century of private sector plunder of the forests and forest resources could not easily be turned around by policy pronouncements and enactment. The implementation of the IPRA (Indigenous Peoples Resource Act) law has yet to be fully funded. CBFM … has yet to be translated into economic benefits at the grassroots level and into bureaucratic commitments to "empower" communities as they protect and manage their forest and forest lands. Without these, CBFM continues to be an ideal to be dreamed of and a passing development fad without touching the lives of the poor and marginalised upland communities and indigenous peoples.

6.5 SUMMARY

A number of issues constrain the development of small-scale and community forestry in the Philippines. These include:

- Political and institutional issues. These include instability in the policies and regulations relating to forestry, inconsistencies in the separation of responsibilities and resource allocation between local and national governments, rent-seeking by government officials, and the variation in political support for community forestry among government agencies;
- Financial issues. These include the lack of government funds available to support community forestry programs, the high degree of reliance on funds from international sources, poor infrastructure in rural areas, the prevalence of rent-seeking behaviour by officials, and the lack of development of markets for small-scale forestry;
- Social issues. These include the lack of trust between rural communities and government agencies, difficulties in establishing and maintaining community organisations, and in many cases, a lack of experience of community partnerships and cooperation; and
- Environmental issues. These include the degraded condition of lands and forests that communities now manage.

The Philippine government has supported the development of community forestry and encouraged smallholders to plant trees in an effort to promote social justice and livelihood support for millions of impoverished landless Filipinos that moved to upland areas and indigenous communities who have always lived in forest regions. Many Filipinos are convinced that the only sustainable means to manage upland areas is to empower the communities that live in or adjacent to these areas. These communities utilised the upland areas despite regulations that had banned farming of publicly owned lands. In some cases this was because they never recognised the governments' ownership of these lands. In other cases because they had no choice as they were unable to support themselves in the competitive and overcrowded lowland areas.

The strategy employed by successive Philippine governments has been to provide individuals, households and communities with some security of tenure, and assistance with livelihood programs, in the hope that this will be sufficient to inspire them to establish sustainable farming practices and protect their lands from illegal logging. Community forestry has come to the point where communities have agreements with the government giving them management rights over more than 5 million hectares of land in the Philippines. Yet the policies and agreements are not sufficient to ensure sustainable management of the natural resources of the Philippines on their own, with time required to change the culture within government organizations, and develop the management capacity of communities and government agencies alike.

Researchers from all organisations have constantly stressed the need to focus on community empowerment and participatory methods as the key to developing successful community forestry. The challenge for extension in community forestry projects in the Philippines goes far beyond teaching communities about sustainable silvicultural practices. Without adequate livelihood support people will continue to utilise the remaining forest resources at an unsustainable rate. Without direct benefits from forest areas communities will not protect forests from clearing or illegal cutting. Without development of health services, sustainable agricultural systems, enterprise management skills, faith in the security of their tenure and market access they will not be able to move out of the cycle of slash and burn or kaingin farming to sustain themselves. Although institutional reform is still required to reduce transaction costs for communities, the community capacity building or 'empowerment' of highly marginalised upland communities appears to be an even more fundamental factor to the success and sustainability of community forestry in the Philippines.

The above review reveals that there are many stakeholders involved in forestry in the Philippines and many challenges confronting the successful operation of community forestry programs and the development of smallholder forestry. Understanding the current forestry context in which rural households operate is vital to aid the design and interpretation of research into the social and economic factors affecting small scale forestry development. The review reveals that there are a many factors that can potentially affect rural households' ability to engage in forestry activities. Improved understanding the diversity of socioeconomic circumstances and value systems of households in rural areas is a step to understanding how these factors interact and how they may be manipulated to improve small-scale forestry development.

Chapter 7

PREVIOUS STUDIES OF LANDHOLDERS' FORESTRY AND AGROFORESTRY PRACTICES IN THE PHILIPPINES

An important means of validating a typology of rural households in the Philippines in relation to small-scale forestry is to assess if the characteristics of the types described are consistent with the findings of previous studies on similar topics. In the Philippines a number of studies have been undertaken to investigate the social, economic and environmental factors affecting the development of small-scale forestry and agroforestry, and the factors affecting the success of community forestry programs. These studies are reviewed in this chapter. In the first section an overview of the studies is presented. In following sections the findings of the studies are examined in detail, with the discussion organised around the sets of 'internal' or individual factors, and 'external' factors, that theorists believe can influence the level of participation and type of forestry activities undertaken by smallholders. In the final section of the chapter a summary of the findings of previous studies is presented.

7.1 OVERVIEW OF THE PREVIOUS STUDIES ON FORESTRY DEVELOPMENT IN THE PHILIPPINES

A number of survey-based studies have been undertaken of the social and economic factors affecting the adoption of forestry, agroforestry and related practices used to make agriculture sustainable in the Philippines. The methods used in these studies range from surveys of those already engaged in tree plantations (Carandang et al. 2000), to interviews with communities and households about their current agroforestry practices (Belsky 1984, Ponce and Bangi 1988, Ngidlo 1990, Nasayao and Zara 1997, Stark et al. 2002), and case studies of barangays that have had some involvement in social forestry and agricultural development programs in the upland areas (Anuilar 1986, de los Angeles and Ygrubay 1992, Sajise and Briones 1996). The majority of these studies were undertaken to improve the design and delivery of community and forestry development projects, rather than focus on developing the understanding of the processes leading to land management decisions that form the rationale for development strategies. The main attributes of the studies are presented in Table 7.1, including author or authors, location, number of participants, methods applied and objectives of these studies.

One common theme in the discussions of the above studies is the concept of the sustainable development of agricultural systems. Related to this concept is the notion of the how to achieve sustainability with the intensification of agriculture, and consideration of various pre-conditions for the development of sustainable systems. A number of studies examined the potential for the development of tree farming systems in conjunction with soil conservation measures. The models developed by Rogers (1995) and Fulton and Race (2001) described in Chapter 3 both separate factors influencing behaviour into internal (or individual) differences and drivers of behaviour, and external influences over which the households have no control. In the following sections the findings of the studies, as listed in Table 7.1, that have examined tree planting and management in the Philippines are reviewed in the context of the various elements of theories about the factors affecting land management and livelihood decisions that were reviewed in Chapter 6.

Table 7.1: Previous studies of landholders' attitudes to and practices in relation to tree farming and agroforestry in the Philippines

Author and year of publication	**Methods**	**Location**	**Sample size**	**Objective of the study**
Belsky (1984)	Case studies, household questionnaires	Leyte	Five case studies, no. of questionnaires not given	Analysis of the causes and effects of socio economic differentiation on hillside farming practices
Anuilar (1986)	Eight case studies using participant surveys	Luzon, Bichol, Mindoro, Iloilo	From 20 to 60 respondents per site	Improvement of the Integrated Social Forestry (ISF) program
Ponce and Bangi (1988)	Household surveys	Four communities in upland areas of Leyte province	25 households per community	Determine the socio-demographic profile of upland farmers and their current use of multi-purpose tree species
Ngidlo (1990)	Household surveys	Four communities in Ifugao	Total of 104 households involved in the ISF program	Examine the relationships between attitudes to land tenure, socio-economic characteristics and the adoption of agroforestry practices
de los Angeles and Ygrubay (1992)	Household surveys	Four provinces across Philippines	Two communities per province, eight communities in total, with 50 households surveyed per community.	To examine the forest and land use practices of the upland poor and the influence of household-specific characteristics, development intervention mechanisms as well as institutional and local conditions on specific tree and forest use practices
Sajise and Briones (1996)	Six case studies	Various parts of the Philippines	Various numbers of households in each case study	Identification of critical socio-economic factors in the development of environmentally sustainable agricultural production systems

Table 7.1: Previous studies of landholders’ attitudes to and practices in relation to tree farming and agroforestry in the Philippines (cont.)

Author and year of publication	**Methods**	**Location**	**Sample size**	**Objective of the study**
Nasayao and Zara (1997)	Household surveys	Leyte and Samar	90 households	Analyse the socio-economic factors affecting the adoption and non-adoption of agroforestry practices
Carandang et al. (2000)	Evaluation of DENR records and questionnaires of existing plantation owners	Throughout the Philippines	DENR regional and national offices plus 63 active plantation owners	Assess current involvement of private citizens in plantation forestry, it’s economic viability, assess the policy framework for private forestry and recommend ways to increase activity
Stark et al. (2002)	Interviews and focus group discussions	Eight communities in Leyte and Bohol	20 farmers per community plus wood processors and dealers	Assess and document local knowledge on indigenous trees in the central Philippines

7.2 VARIATIONS IN THE CHARACTERISTICS OF INDIVIDUALS THAT ARE RELATED TO DIFFERENCES IN LAND MANAGEMENT BEHAVIOUR

In the following sections the findings of surveys of households tree planting and management attitudes and behaviour are reviewed through a examination of their findings, firstly in relation to the internal or individual factors.

7.2.1 Awareness of Forestry and Land Management Issues

According to the theories of decision-making of Rogers (1995) and Fulton and Race (1999), the first step in adopting a practice is the recognition of the issue or problem to be addressed. In the case of decisions to undertake tree planting, the issue could be the protection of soil resources, the diversification of agricultural production, the development of timber resources for the household or for sale, or combination of these reasons. Ponce and Bangi (1988) observed that the majority of farmers in the communities they studied viewed land degradation and loss as an inevitable process of farming which could not be ameliorated or prevented through tree planting. In regard to securing timber supplies, Ponce and Bangi (1988) reported that the community members preferred to utilise existing forest resources rather than develop new resources, despite their recognition of the decrease in timber supplies in their area at the time.

The situation regarding farmers' awareness of soil conservation processes and potential practices to address the problems observed by Ponce and Bangi (1988) is different in the study of ISF-CARP beneficiaries reported nearly 10 years later by Nasayao and Zara (1997). These communities had received training in social forestry and soil conservation practices, and more than 90% of those interviewed stated that the old agricultural practices could be improved by modifying their practices through the adoption of some of the suggested practices, including tree planting. The motivating factor for adopting the conservation practices according to the Nasayao and Zara (1997) was to make money, an observation made earlier by Anguilar (1986). The dominant reason for not adopting the practices was said by Nasayao and Zara (1997) to be the security of 'clinging to the old ways', despite more than half non-adoptors acknowledging that the new practices could control soil erosion. Other studies reviewed for this thesis did not report on the awareness of problems or situations that be improved through tree planting and management.

7.2.2 Cultural Factors Affecting Tree Planting and Management

According to the model of Fulton and Race (2001), the attitudes, values and goals of a household influence their decision about the appropriateness of forestry development. Innovation adoption theorists such as Rogers (1995) have listed ‘felt needs and problems’, ‘previous practices’ and ‘norms of the social system’ as factors that influence the ‘prior conditions’, the conditions that lead to consideration of the adoption of a practice. In other words once a practice has been used in a community it becomes a more obvious choice if similar circumstances arise again.

Among many indigenous ethnic communities in the Philippines, swidden (or slash and burn) agriculture was a fundamental part of their livelihood activities (Belsky 1984, Jocano 1998a). While ever there was forest cover these people were able to clear patches of forest and use the land for one or two years before the soil fertility decreased and the household moved their farming activities to a new site, leaving the old patch to regenerate for a number of years. These indigenous groups have been forced to move into more and more isolated areas due to increased population pressure as people migrated in from lowland areas. In the past, it was common that people who lived in lowland areas and lacked land altogether, or had only small plots, would also utilise upland areas to supplement their household food supplies and income. They would use the agricultural practices familiar to them from the lowlands. The use of these lowland practices in conjunction with intensification of agricultural practices in the upland areas has been blamed for the degradation of the environment (Garrity et al. 1993, Belsky 1984 and Kummer and Ho Sham 1994), as discussed in Chapter 2. With access to public forest resources not controlled in most places, rural households were accustomed to utilising these resources for their timber needs.

A number of surveys have examined the current tree planting and management practices used by smallholder farmers at the times of their studies (Belsky 1984, Ponce and Bangi 1988, Nasayao and Zara 1997, Carandang et al. 2000 and Stark et al. 2002). In general, these authors concluded that where natural forests still exist the majority of farmers prefer to obtain wood from them rather than plant trees on their own land and potentially displace food crops. Whilst the above authors stated that farmers did plant a few trees, in particular fruit trees, and manage some regenerating trees, their knowledge of agroforestry practices was low and rarely formally practiced. Silvicultural systems used by smallholder farmers have been described as simple (Stark et al. 2002), and as lacking sufficient rigor to obtain the maximum potential growth rates and timber quality of the species used (Carandang et al. 2000). Stark et al. (2002, p. 14) reported that:

> Although farmers have limited knowledge about silvicultural practices in tree domestication, they have implemented locally-adopted practices for indigenous trees similar to those applied in established tree farms or plantations. Placing of tree guards, watering and weeding as commonly applied to newly planted exotic trees was rarely done, instead, simple unsophisticated silvicultural techniques have been the standard practice:
>
> - Selection of the quality of planting materials is not given particular attention.
> - Generally, fertilization is not done for timber trees, only for a few higher-valued fruit tree species.
> - The importance of thinning and/or pruning are realized but hardly practiced. Pruning, as practiced by a few, is primarily done in order to obtain fuelwood or to reduce shading to farm crops like corn or rice.
> - Agrosilvicultural systems exist, though not through conscious efforts in most cases.
> - Harvesting is traditionally done by axes and bolos. Increasingly, however, chainsaws are employed as it speeds up work and is less laborious. Selection cutting has been the usual practice as it befits the final use of the timber.

Anguilar (1986) observed that a primary purpose of many social forestry projects is to enable the transfer of technology to upland farmers, implying that they do not have the capacity to exploit the resources without harming them. He then argued that upland farmers, especially indigenous peoples, do have local practices developed to protect land resources. He contended that the migrants from the lowlands also have methods to deal with soil erosion which are continually evolving as they experiment with their farming practices. Like many other researchers that have examined the transfer of technology, Anguilar (1986) stressed the importance of first identifying the indigenous conservation practices such as indigenous agroforestry systems or terracing being used by farmers, followed by continuing discussions between project proponents and farmers to empower the farmers to modify their activities in a manner that will benefit both the farmers' households and the broader society.

7.2.3 Household Resources and Farming Practices Affecting Tree Planting and Management

Once a landholder has reached a decision to investigate the potential for tree planting, the next step requires an appraisal of potential for trees to provide the functions required by a rural household. For many households the most important of these functions is the ability to provide for the households basic food and cash needs (Belsky 1984, Ponce and Bangi 1988). With many Filipino farmers living below the poverty line, their ability to invest in long-term projects is strictly limited (Belsky 1984, Aguilar 1986, de los Angeles 2000). Many are exclusively concerned with surviving from day to day and need assistance to break their poverty cycle and their reliance on subsistence farming practices. In some places, access to off-farm income does appear to allow some farmers to modify their traditional farming methods, but these opportunities are limited in rural areas of Leyte and throughout the Philippines.

In her study of a community in Baybay municipality (Leyte Province) in 1983, Belsky emphasised the primacy of economic factors in determining landholders preferences and behaviour. She stated that: ‘Household economic need and preference for using hillside farms to produce food or cash (a function of needs unmet by alternative livelihood sources), rather than land tenure of hillside farms, explain existing cropping patterns. Different agroforestry land use systems and cropping patterns are found to be necessary to reflect the needs and preferences of farmers, even within one village.’ (Belsky 1984, p. i). To assist the interpretation of the data she collected, Belsky stratified the households into three groups according to the proportion of their own requirements they were able to produce. Belskys’ study, reviewed in Chapter 4, revealed that land tenure was not the main driver of the choice of cropping system adopted by households, even though land tenure status differed significantly between the various groups she had defined. Belsky also concluded that it is the lack of non-agricultural economic activity that is the fundamental cause of the unsustainable nature of the agricultural practices that were being employed.

The importance of livelihood security as a prerequisite to tree planting activity was also stressed by Aguilar (1986), Angeles-Reyes 1987, Raintree (1987, 1991), and Ponce and Bangi (1988). The appropriateness of any proposed changes to land-use systems varies across communities depending on the socio-economic circumstances, attitudes and values of the household members. Few studies have, as did Belsky (1984), explicitly examined the relationships between variations in tree planting and management within communities and the economic resources of households.

Those studies in the Philippines that have examined the relationship between household income and tree planting and management behaviour have reported that those actively involved in the practices are relatively better-off than those with lower tree planting and management activity. Nasayao and Zara (1997) found that the application of ‘improved agroforestry technologies’ increased with farmers’ incomes. Carandang et al. (2000) observed that the majority of plantation owners with estates registered with the Department of Environment and Natural Resources (DENR) were businessmen and government employees (28.6% and 23.8% respectively), followed by farmers (22.2%), all described as comparatively better-off members of the community. The studies of Belsky (1984), Aguilar (1986) and Ponce and Bangi (1988) emphasise that food production takes priority over conservation measures, including tree planting, in poorer households in the community. These authors recommend that projects that seek to encourage tree planting and other soil conservation practices need to incorporate livelihood development activities as a central part of the projects. Angeles-Reyes (1987) observed that the failure to raise the productivity of a large proportion of agricultural activities in the Philippines, particularly the upland areas, in conjunction with high population densities and lack of off-farm employment opportunities, resulted in a situation where ‘…the household head’s income from his main occupation (which in most likely to be farming in this case) is inadequate to provide for the basic needs of the household. Thus, reliance on farming as the only source of income greatly reduces a rural households’ ability to move beyond the poverty line.’ (Angeles-Reyes 1987, p. 27).

Related to the issue of household livelihood are the topics of access to credit sources and markets. The access to credit facilities to finance tree establishment and maintenance is consistently mentioned as an important factor influencing the ability of landholders to participate in tree farming activities. The relationship between the availability of credit and tree planting and management activity was investigated in Leyte by Peque (2004), who found that credit providers lack interest in provision of credit for tree farming where the credit could not be guaranteed by formal land title documentation.

Reviews of the operations of existing tree plantations on private land by Carandang et al. (2000) and Venn et al. (2001) concluded that they could be profitable, with IRRs of between 18 to 45% for popular species including Gmelina, Mangium, Bagras and Mahogany. They found that in the year 2000 there were 42,500 ha registered as tree plantations with the DENR. DENR personnel at the time estimated that this represented only 50 to 60% of all tree plantations because many are not registered. These authors found that many of the plantation owners are the better-off members of the community. It was reported that all the respondents had established plantations with a desire to make profit. However, it was also found that many plantations lacked the silvicultural treatments including thinning required for maximising production and thus their returns.

7.2.4 Human Capital as a Factor Affecting Tree Planting and Management Activities

The concept of ‘human capital’ includes the skills and existing knowledge of farmers, and these are some of the factors that influence decisions on livelihood strategies and land management practices generally. Innovation adoption theorists maintain that those who take up practices earliest are in part characterized by their higher than average education levels (Rogers 1995). It is hypothesized that these people are better able to translate the results of field trials and other experimental research to their own circumstances. In other words, it is thought that these people are better able to learn from and adapt information from ‘abstract’ or theoretical information sources. For innovation adoption theorists the ‘cosmopolitaness’ of the farmers, or degree of contact outside their immediate community, and the use of diverse information sources, are also important factors, and are frequently correlated with higher education levels.

Human capital development includes factors formal and informal education, as well as farming experience. Only two studies reviewed for this chapter – those of Ngidlo (1987) and Nasayao and Zara (1997) – examined the influence of formal education on the adoption of agroforestry practices. Ngidlo (1987) concluded that under the ISF program increased levels of formal education were associated with increased negativity in attitude to tenure security, but found no links between educational attainment of the household head and level of adoption of agroforestry. Nasayao and Zara (1997) reported no significant direct relationship between education level and the adoption of agroforestry practices, but did report a correlation between the perception that agroforestry practices are costly and education levels. Unfortunately, their paper does not state if the correlation was positive or negative. Nasayao and Zara (1997) did report that attendance at farmers meetings, training sessions and cross-farm visits were positively related to the adoption of agroforestry practices, along with the mobility of the farmers, measured by the frequency of trips to towns and cities. This could be another measure of ‘cosmopolitaness’ as described by innovation adoption theorists (Rogers 1995).

7.3 FACTORS EXTERNAL TO HOUSEHOLDS THAT RELATE TO DIFFERENCES IN LAND MANAGEMENT BEHAVIOUR

The influence of external factors, including the political situation, was not specifically examined in any of the studies that used household surveys which are reviewed for this thesis. Discussion of these factors is restricted to reviews of the community forestry programs by funding agencies and university-based researchers who have used case studies and interviews of key informants (e.g. Bisson et al 1997, Johnson 1997, Utting 2000, Guiang 2001 and UNFAO and FMBDENR 2003).

7.3.1 Market Access and Political Factors Affecting Small-scale Forestry Activities

The state of physical transport infrastructure development is generally poor in Leyte, with all-weather roads in the coastal areas only built over the last past five years, and few roads, which are sometimes closed, providing access to mountainous regions. Physical access to markets is thus difficult for most upland communities and a major concern for them, not only for forestry operations, but for the marketing of all their products.

Due to the number and scope of regulations covering forestry in the Philippines, market access is inseparably related to political factors. An important factor that households must consider in regards to market access is the regulatory framework governing forestry enterprises and related bureaucratic requirements. While no restrictions are placed on the price that may be paid or received for wood products, the permit system and harsh penal sentences used to control the harvesting and transport of timber products is restrictive in that most smallholders are uncertain about the requirements or unable to meet them because they lack formal title to the land they use for farming. Even with formal land title certificates tree harvest and transport permits are difficult to obtain as landowners must provide detailed management plans, travel to the DENR offices to commence the process and frequently have to pay for the DENR officials to visit the site of the trees as well.

Reviews of community forestry programs based on discussions with communities and those in support and administrative roles have mentioned the need to simplify the regulatory framework and bureaucratic requirements to facilitate smallholder forestry development (Bisson et al. 1997, Guiang 1999, 2001), but surveys of landholders reviewed for this thesis have not specifically examined this issue. The frequent changes to forestry regulations, such as the temporary banning of harvesting in CBFM areas in the mid 1990s and 2003, and lack of information about the operation of regulations increases the landholders perceptions of the sovereign risks associated with forestry (Teroso 1999, p. 13). Also the markets for locally grown timber products are poorly developed. The banning of forestry operations in native forests in most Philippine provinces has led to a huge decrease in the size of the forestry industry in the Philippines, and the development of markets for illegally cut timber (Guiang 2001c). The imposition of heavy fines and imprisonment for those caught selling timber without permits, even when cut from their own land, leads to suspicions that harvesting planted trees will not be allowed and is cited by some researchers as being a major constraint to the development of smallholder tree farming activities.

The study of Stark et al. (2002) included interviews with wood processors and timber buyers. They concluded that the policies of the DENR were having a major negative impact on the development of small-scale forestry, particularly in regard to growing indigenous species. They stated that:

> The strict implementation of DENR policies against those who illegally cut timber has made it difficult for wood processors to procure raw materials. Hassles in the processing of papers and legalities involved in timber cutting, processing and transport, (e.g. high payment for the issuance of a cutting permit involving indigenous trees) had significantly decreased woodcraft production while the demand for its finished products had apparently increased over time.
>
> Special arrangements between furniture processors and buyers are often made due to scarcity of available preferred raw materials for a particular product. The special arrangement is that the buyer himself brings his own raw material for the product that he wants to be manufactured. This way the processor can do away with problems in the legalities of buying and transporting raw materials from the timber suppliers or sources. Also chainsaw owners make arrangements with tree owners, usually their service fees are paid in terms of wood volume rather than cash. (Stark et al. 2002, p. 15).

When Carandang et al. (2000) examined the expected financial returns to registered plantations in the Philippines they found that the rates of return to plantation forestry are more attractive than those for agricultural products. They further observed that the financial returns to plantations

> …can improve if the market for plantation wood in the Philippines would function well. The study showed that in most areas, monopolistic and oligopolistic practices prevail, putting tree farmers at the mercy of the few buyers of wood who go to their areas. As a result, tree growers do not make a high profit, while the buyers enjoy windfall profits (Carandang et al. 2000, p. 9)

Nearly all reviews of community forestry development programs in the Philippines stress the importance of developing community management skills. The role of community organisers is thought to be critical, to assist the community to set up organisations that are self-governing and self-reliant, and to facilitate communication between the communities and funding and regulatory agencies (Bisson et al 1997, Johnson 1997, Pulhin 1998, Donoghue 2001, Guiang 2001b). The role of the community organiser is, in part, to assist the community in the formation of the community organisation and preparation of the documentation necessary to satisfy bureaucratic requirements for forestry activities. Good communication requires close rapport between the community and the community organiser. The community must believe that the organiser is genuinely interested in their welfare and willing to aid them in developing community forestry projects (Nasayao and Zara 1997). Unfortunately, the community organisers frequently do not receive the necessary resources to complete their tasks in aiding the community. They have also suffered from the lack of clear career directions and, like the communities they serve, suffered due to the repeated delays in providing money for projects or early termination of projects (Bisson et al. 1997, Pulhin 1999, Guiang 2001b).

7.3.2 Resource Security Issues Affecting Small-scale Forestry Activities

Resource security rights, including the rights governing the use of trees and land management rights or tenure security, are factors frequently described as related to the adoption of forestry and other activities that offer long-term benefits such as conservation practices (Aguilar 1986, Raintree 1987, 1991, Place and Swallow 2000, Stark et al. 2002). Only one of the studies reviewed for this chapter, Ngidlo (1990), has explicitly tested for the presence of relationships between tenure status and tree planting and management attitudes and behaviour. Secure land tenure is required by landholders, in part because of the time lag between investment in the forestry and returns from forestry activities. To have an incentive to invest in forestry, landholders need to be confident that they will be able to reap the rewards of investing in forestry activities in the future.

It should be noted that while the formal legal status of land tenure is important, it is the landholders' perception of the security of tenure that really counts. While landholders may officially be legally entitled to the use of a parcel of land, they may, because of misinformation or past experience, be unsure of their entitlements. For example, while there are now a number of legal mechanisms to grant upland farmers secure tenure to what is officially 'public forest land' (e.g. through the granting of Stewardship certificates or CBFMAs), landholders are still concerned that if they develop a parcel of land it could be claimed by powerful members of the local and state elite when benefits from the development begin to occur (Harrison et al. 2001). In his study of participants in the Integrated Social Forestry Program (ISF), Ngidlo (1990) observed that the personal demographic factors, including the age structure and marital status of the household members, land size, household income, and the influence of change agents, played a greater role than attitudes to land tenure in directly influencing the adoption of agroforestry practices. Attitudes to land tenure were found to interact with both income and the marital status of the respondent, with a positive attitude to land tenure under the ISF program in conjunction with higher income levels, or being married, resulting in significantly higher likelihood of high adoption of agroforestry practices (Ngidlo 1990).

Continuing uncertainty about both the boundaries of municipalities and the official classification of land by the national agencies for agriculture (DA), forestry (DENR) and agrarian reform (DAR) further undermine community confidence in land tenure security (de los Angeles 2000). Some reports have noted the existence of an active informal market for cultivatable land in upland areas (Ooi 1987, de los Angeles 1988, p. 44). The existence of multiple systems of ownership and classifications of land types and tenures, formal and informal, serves to complicate the security of land ownership and land use rights.

The implementation of community forestry programs is one approach that has been used to provide a legal framework to regulate households' access to areas that have been officially classified as belonging to the government. The security of tenure in these areas is complicated by the communal nature of the land management. Various types of agreements have been trialled, from those where land management was determined by community organisations, to others that subdivided the communal lands to parcels and leased them to individual households (Bisson et al. 1997, Johnson 1997, Balanan et al. 1999). Studies of the effectiveness of these programs in providing tenure security have found that the community organisations frequently cannot provide the level of property rights security needed to encourage investments in long-term activities, and recommend that households be given use rights to particular parcels within community forestry areas (Johnson 1997).

7.4 SUMMARY OF FACTORS AFFECTING LAND MANAGEMENT BEHAVIOUR OF SMALLHOLDERS IN THE PHILIPPINES

Theories about the processes involved in decision-making about the use of trees and the take-up of new practices generally all emphasise the importance of a combination of environmental, social and economic factors in determining the types of uses and level of density of trees in the landscape. There is broad agreement about the types of factors involved, such as the role of awareness, the importance of sufficient resources for secure livelihoods, and the importance of the biophysical, political and social environments in which land management takes place. It is apparent from the results of the previous surveys, however, that the way in which the factors interact varies greatly across the Philippines and, as anticipated by the theories reviewed, their influence changes over time for each household.

Previous studies of the socioeconomic factors affecting upland farmers' use of trees in the Philippines have varied considerably in their scale, both in terms of the spatial coverage as well as the number of respondents, and also their scope in terms of the topics covered. The majority of the studies reviewed in this chapter have included a survey of approximately 100 respondents, with a maximum of 400 respondents in the case of the survey by de los Angeles and Ygrubay (1992). The number of respondents in most of these studies was insufficient for sophisticated statistical testing. In the majority of the surveys reviewed, the statistical analyses of the responses was limited to exploration of the relationships between pairs of variables, and frequently only used descriptive rather than inferential statistical techniques. The exceptions are the studies of

Ngidlo (1987), who applied multivariate analysis techniques, and Belsky (1984), who used clustering of the respondents together with immersion and participant observation techniques to guide the analysis of her data. The result is that while the majority of the studies can confirm the existence of a relationship between factors, such as the size of the landholding held by the household and the degree of adoption of agroforestry practices, they are unable to define whether a causal relationship exists, or describe the interactions between socioeconomic variables that lead to variations in land management behaviour through the use of multivariate statistical tests.

de los Angeles and Ygrubay (1992) did use farm size classes and to some extent wealth ranking classes to investigate the variation between the communities they studied. They did not report the findings of the study using the categories of farm size or wealth ranks to compare responses within communities however, at least not in the publication used for this review, except for the cases of describing significant variation in the sources of fuelwood and use of charcoal between households with differing sizes of land parcels farmed. When de los Angeles and Ygrubay (1992) used regression analyses to investigate the relationship between continuous socioeconomic variables and fuelwood sources and gathering intensity, they were forced to conclude that the use of bivariate regression analyses did not allow definite conclusions to be made about hypothesized relationships between socioeconomic characteristics of households and their behaviour. Given the complexity of the interrelationships between these characteristics and behaviour their conclusion is not surprising.

A further problem de los Angeles and Ygrubay (1992) encountered was that the large degree of variation within variables in their dataset when the data from all eight communities was combined for regression analyses. They reported that for many of the socioeconomic variables they collected, the standard deviation is greater than the mean (de los Angeles and Ygrubay 1992, p. 43), which they attributed to differences between rather than within communities. They recommend undertaking regression analyses within single communities to avoid the problem of inter-barangay variation, although they cautioned that the lack of variation in specific variables within barangays may result in a lack of sensitivity of the tests. These observations contradict the conclusions of a number of other authors (Belsky 1984, Aguilar 1986, Byron 1987, 1996, Raintree 1987, 1991, Pulhin 1998, Bisson et al. 1997, Donoghue 1999, Contreras 2000), who have emphasised that the substantial variation in socioeconomic circumstances within communities results in difficulties in specifying solutions that suit all types of people, and those interventions that are introduced have differing impacts on the different types of households.

The idea of the poverty cycle preventing upland farmers from participating in social forestry programs and implementing the 'socially desirable' level of conservation practices is prevalent throughout reports of the studies of small-scale, social and community forestry. The importance of adequate resources as a precondition before substantial tree planting activity can commence is confirmed by the study of Carandang et al. (2000), which examined at the socioeconomic characteristics of owners of private plantations registered with the DENR. They concluded that the majority of plantation owners are owners of non-agricultural businesses, government employees or large-scale farmers. This emphasises the point made by authors whose studies were located in areas with high levels of poverty, including Aguilar (1986) and Ponce and Bangi (1988), that farmers who were constantly struggling to survive from day to day and season to season do not have the opportunity to invest activities with long-term payback periods. The importance placing tree planting and management activities in their social and economic context was well recognised and undertaken by the majority of the studies reviewed for this chapter.

The results of previous studies can be used to develop a set of statements concerning the relationships between the socioeconomic characteristics of households and their land management behaviour. These studies have concluded that higher levels of tree planting and management are associated with the following characteristics:

- Perception of the advantages of increased tree cover to address environmental degradation such as the loss of soil fertility, extreme flooding events, inconsistent or low water supplies for irrigation, and the loss of biodiversity (Nasayao and Zara 1997, Ponce and Bangi 1988);
- Sufficient levels of economic resources such as access to farm land, labour and sources of cash income to provide livelihood security (Belsky 1984, Aguilar 1986, Angeles-Reyes 1987, Ponce and Bangi 1988);
- Security of tenure over both trees and land resources (Aguilar 1986, Raintree 1987, 1991, Place and Swallow 2000, Byron 2001, Stark et al. 2002);
- Perception of the advantages of tree planting and management in providing livelihood security relative to other potential activities (Place and Swallow 2000);

- High levels of formal education; (Ngidlo 1987, Nasayao and Zara 1997);
- The ability to protect the trees from damage or theft (Byron 2001); and
- Demographic factors such as the stage in the life-cycle of the household (Ngidlo 1990).

7.5 IMPLICATIONS OF THE PREVIOUS STUDIES FOR THE CURRENT RESEARCH

It is possible that investigation of the relative importance of the influence of various socioeconomic factors on land management behaviour using multivariate statistical techniques could help to improve understanding of the relative influence of these factors, and allow an assessment to be made of the degree of variation within communities and between them. It would help to answer both the following research questions posed for this thesis, namely ‘What are the social and economic factors affecting tree planting and management activities and how do they inter-relate?’ and ‘Do these factors vary in influence between households within communities, and if so, are there discernable patterns in this variation?’

If the relationships between socioeconomic factors and tree planting and management behaviour and intentions are identified, it will be possible to assess the validity of the groups of cases formed through cluster analyses of the data using assessment of the predictive validity of socioeconomic differences between members of the groups. For example, suppose that a study investigates the influence of socioeconomic factors on behaviour in two barangays, A and B, and finds that there are two distinct types of households in relation to the pattern of socioeconomic factors influencing their land management decisions, named as type Y and type Z. In this case the research question could be framed as: ‘Are the factors affecting the behaviour of type Y households in barangay A more similar to the factors affecting the behaviour of type Y households in barangay B than the type Z households in barangay A?’. In other words, are there more similarities between certain households from differing communities than between some households within the same community? Such research could help answer the question of the influence of factors specific to various locations, such as the biophysical conditions and transport infrastructure, relative to the influence of factors independent of locations including household income and household size.

There is also possible that there is variation in the influence of socioeconomic factors on tree planting and management behaviour between regions. Assuming a typology of households can be defined, what is the degree of variation in the influence of factors between regions? These questions have important implications for the design of programs, policies and regulations to support small-scale forestry development. Answering the first question above could assist the understanding of the differential impact of the programs, policies and regulations between households within communities. Answers for the second question could provide information about the degree of regional variation in programs, policies and regulations that is required to match the programs to the needs of rural households. This question will not be addressed by this thesis because the data gathered for analysis is all from within one region.

Chapter 8

FINDINGS FROM THE FOCUS GROUPS DISCUSSIONS USED TO GATHER BACKGROUND DATA AND PROVIDE CONTEXT FOR THE STRUCTURED HOUSEHOLD INTERVIEWS

This chapter describes the results of a series of focus group discussions held in four communities in Leyte in July 2002. The approach taken in the focus group discussions (FGDs) was to use a series of activities to explore the topics being examined in the study. The activities included: documenting the community history; development of lists of reasons for and constraints to tree planting; developing lists of preferred tree species and potential products from trees; community mapping exercises; a strengths, weaknesses, opportunities and threats (SWOT) analysis of the communities; and the development of a timetable of annual activities. The objectives of the initial FGDs were: to obtain preliminary information about the barangay not included in the documents of the barangay; to have a better picture of the barangay in terms of its' history and community dynamics; and, to gather information necessary for the construction of the household interview schedule. In this chapter the results of the initial FGDs are presented, and the similarities and differences between the communities are examined. The sections are structured to follow the activities that were undertaken in the FGDs. The first section examines the histories of the communities, the second discusses the participants perceptions of the characteristics of various well-being categories in the communities, the third section examines the results of the SWOT analyses, the fourth and fifth sections detail the reasons for and constraints to tree planting and management and provides a list of the tree species preferred by participants. In the sixth section the experiences of the communities involved in the research for the thesis are reviewed before a summary of the chapter is given in the final section.

8.1 COMMUNITY HISTORY

Over the past 50 years a number of changes have occurred in the environmental, social and economic conditions of the four chosen barangays, being Tigbao, Poting Bato, Conalum and Rizal II. In regards to the biophysical environment, participants in the FGDs noted the rapid conversion of the land from forest to agricultural, residential and commercial uses, especially after the end of the World War II. They noted that many people were attracted to their areas by the abundance of natural resources, including the natural forest resources, and the potential to claim and develop land for agriculture. It was observed that the biophysical resources in their communities are presently degraded and their condition continues to decline. ‘Environmental’ problems for agriculture include siltation of irrigation systems, less water for irrigation, and declining soil fertility. In terms of biodiversity conservation, participants noted that wildlife numbers had greatly decreased, and that very few natural forest resources remain intact.

The social and economic infrastructure in the barangays has been developed over the same time period (i.e. since the 1940s). In the middle of the 20th century there was limited transport, education and health infrastructure in all of the barangays. The roads to the two barangays centered in the lowlands (Conalum and Rizal II) were concreted in the last four years as a part of the upgrading of the national highway system funded by the World Bank. The roads to the upland barangays remain unsealed, although other aspects of their infrastructure have improved. For example, these upland communities have been connected to the main electricity network during the last 10 years, and health centres have been established in some of the communities but remain under-resourced. Education infrastructure for elementary schooling is in place in all the communities except Rizal II. A high school has been established in Conalum. The out-migration of a number of families has seen the recent reduction in the number of grades taught in the Elementary school in Puting Bato. Day care facilities for infants have been recently established in Rizal II.

The participants noted technological changes in the agricultural and forestry practices used by community members. The ‘green revolution’ of agriculture, including mechanization of land preparation and crop processing, and the use of purchased seeds and chemical fertilizers and pesticides, has influenced farming practices in all the communities. Forestry practices have also changed from the use of mechanical equipment. Communities in Rizal II and Tigbao have the largest irrigation areas. The irrigation area in Tigbao was developed by the community working together to establish the infrastructure. The irrigation infrastructure in Rizal II has recently been expanded by the national government, and a community organization is involved in the management of the area under guidance from a government technician. Participants in Poting Bato reported a decrease in the volumes of water from the springs in their area, as did those in the other upland barangay of Tigbao.

Cultural changes in the barangays were reported by the participants, including the holding of elections, and the start of community members working in urban centres. Participants observed that there is generally less respect for and obedience of community laws. Common impressions of the state of the barangays in the past and their state at present are illustrated in Table 8.1.

Table 8.1. Common impressions of changes in the four barangays

Common Responses	
Past conditions in the barangays	Present conditions in the barangays
Infrastructure was absent or minimal Abundant wildlife Abundant trees Fertile land for agriculture Water levels were high and condition of river was good Low population Forested barangay No transportation facilities No electricity	Infrastructure are built Less wildlife Less trees Needs inputs such as fertilizers Lowered water level, conditions are bad Increasing population Lands converted for agriculture Transportation is easy Electricity service is available
Other Responses	
No elections held Laws of the barangay were strictly followed Nobody worked in urban areas	Elections are held for the barangay officials Laws are not adhered to Many are working in the urban areas

8.2 INDICATORS OF WELL-BEING CATEGORIES

In order to describe and analyse the differences within and between communities, participants in the FGDs were asked to describe which characteristics differentiated the various levels of well-being in their community. The most common indicators of well-being in the community related to resource ownership. Other indicators were related to attitudes and particular types of behaviour. The participants were asked to describe the characteristics of four types of households, namely the very rich, rich, poor and very poor. The distinguishing characteristics are summarised in Table 8.2.

The ‘very rich’ category is the category with the highest level of well-being. They are characterised by the ownership of multiple businesses which can generate a high income for these households. The ownership of a large tract of land and a lot of leisure items are other common indicators for this category. Some indicators are similar to those of the second category, with those in the ‘rich’ category reported to own some business interests other than the farm. The main difference between the two most affluent categories, apart from the amount of the resources owned, is that that they have different sources of income. Those in the ‘rich’ category are likely to own smaller businesses, such as a sari-sari store, than those in the ‘very rich’ category, or more likely to receive money through remittances from relatives working in the urban areas or overseas. The individuals or families that belong to these categories have sufficient income to send their children to school without financial stress. The land they cultivate is often their own, and the area of their farming land is large enough to support the household.

The third group in terms of level of well-being– ‘the poor’ – were characterised as owning some land, but typically were tenants on most of the land they use for agriculture. Many of the adults in this category have a low level of education since, at the time they were young, their parents did not value school as more important than work. Nowadays, however, most try to provide education for their children. Generally the livestock and poultry owned by the household are for family use only. The willingness to work more is one of indicator that the individual may fall under this category (Table 9.2).

The group with the lowest level of well-being was termed the ‘very poor’. The households in this category were differentiated from the poor partly by their ‘poor attitude to work’, which was commonly assumed by focus group participants to be the cause of why individuals remain poor. Income for these households is thought to be insufficient to send their children to school. These households are described as having no landholdings, with some squatting in the highlands according to several participants (Table 8.2).

Table 8.2. Characteristics of various types of households described by participants in the focus group discussions

Type	Childrens education	Land size	Tenure	Leisure materials	Live stock	Housing type	Attitudes /traits	Work status	Income sources
Very rich	Send their children to school	Owner of a large tract of land (riceland, coconut and abaca plantation)	Land owners	Owner of multicab and vans for hire, private service car and motorcycle Have a complete set of appliances		Concrete	Industrious Exerts effort to have more income	Have a good job	Have multiple businesses Own possibly a welding shop, rice mill and bakery
Rich	Send their children to school	Owns a farm (riceland, coconut plantation, root crops and abaca)	Land owner	Own a vehicle Can buy their daily needs Can eat three times a day	Owns pigs, carabaos and cows	Concrete house	Industrious Saves their extra income	Works on farm Councillor in the barangay	Have a continuous source of income from a variety of farm and nonfarm sources
Poor	Did not finish his education because he prioritised working more than school	Sent their children to school Own a small rice field, plus coconut, abaca and banana plantations	Tenant	Can eat enough three times a day	Own a carabao, chickens and cows	Concrete or mixed materials	Willing to work to the extent to support his family	Employed in a variety of jobs	Teacher Tuba gatherer Works as a labourer
Very poor	No income allotted for education	Children have not attended school due to financial constraint	No land holding	None No good clothing	Owns for home consumption (pig)	Light materials (Bamboo)	Lazy No family planning Drunkard	Works as a hired labourer	Income not enough to support the family

There are large differences in the socioeconomic conditions of households within each community that are recognised by the community members. Those in the two highest well-being categories can eat three times a day and buy most household appliances and luxury items they want, while those in the lowest category commonly eat less than three meals daily. The top two categories are characterised by their ownership of businesses, and by the diversity of their sources of income that includes ownership of large parcels of land. Households in both the ‘poor’ and ‘very poor’ categories have limited or no land ownership, and work as labourers for others on occasions. There was considerable variation between the communities in the proportion of households in each category, with FGD participants in Poting Bato reporting a higher proportion of their households are in the poor and very poor categories relative to the other communities.

8.3 STRENGTHS, WEAKNESSES, OPPORTUNITIES AND THREATS (SWOT) ANALYSES

The SWOT analysis activity of the FGD was designed to gather information about the factors affecting the development of the barangay. The participants were asked to identify the strengths, and weaknesses of the barangay, and the opportunities and threats to the barangay in terms of the resources available to households in the communities. One objective of the activity was to contextualise the importance of tree planting and management activities, to aid consideration of how tree planting and management could be used to assist in the overall or total development of the communities. The resources discussed included: the biophysical environment (upland, coastal, mineral deposits); community institutions; demographic characteristics; projects provided by the government and other institutions; and the operations of NGOs.

While participants from Tigbao saw opportunities in the large areas of vacant surrounding lands, those from Puting Bato do not see this opportunity despite also being located in an upland area. Another difference between participants in Tigbao and Puting Bato was that the Tigbao residents recognised that they gain strength from having educated people in the community and family members working abroad or outside the district who send money to households in the community. On the other hand those in Puting Bato reported that the educated people are leaving the community and few are remitting money. In the following sections, the SWOT analyses of each community are presented individually.

8.3.1 SWOT Analysis of Barangay Conalum, Inopacan

The participants in the FGD identified the strengths of the barangay as the infrastructure, labour power, community development projects, and land and sea resources available to the residents (Table 9.3). The weaknesses of the community were identified as being the lack of cooperation in community projects, jealousy and laziness within the community, lack of access to financial assistance and credit facilities, and the lack of adoption of modern farming practices.

The opportunities for the community identified by participants relate mainly to the potential to develop the land, sea and human resources within the barangay. The participants singled out the potential to increase the area of land capable of producing rice and the potential to grow root crops in the mountainous areas. In terms of human resources, the participants saw the presence of development programs as a chance to raise the level of awareness about and adoption of modern farming techniques and improve cooperation between community members. The presence of well-educated professional people in the barangay and the connections of households with family members in urban areas were viewed as opportunities to aid the economic development of the community. The threats that were identified by the community included factors outside the control of the community, including the possibility of natural disaster and calamities, such as typhoons and drought, that will damage the agricultural production and housing, or financial crisis that may undermine the success of economic activities. There was concern about the risk that foreign support will not be properly managed, and the risk that programs and projects will not be sustainable because of mismanagement. There was also concern about the lack of appropriate markets for some agricultural products, the lack of transfer to other people of education and training gained by those who have attended training seminars, the migration of professionals from the community, and the failure of small business due to the competition from medium scale business operations in the area.

Table 8.3. Strengths, weaknesses, opportunities and threats as perceived by the FGD Participants of Barangay Conalum, Inopacan, Leyte

Strengths	Weaknesses	Opportunities	Threats
Availability of manpower	Personal vested interest on livelihood projects provided	Vast land area and municipal waters	Natural calamities (typhoon and drought)
High Population	Lazy		Financial crisis
Most of the People in the barangay are well off	Sharing scheme for tenant is not enough	Some of the people in the barangay are working abroad	Support services are not properly implemented
Vast land area	Lack of financing/ farming or fishing	People are organized	Programs and projects are not properly implemented
Situated in between the mountains and sea	Lack of infrastructure facilities	Farmers have enough training in terms of farming techniques	Difficulties in marketing farm products
Sufficient Farm to market roads	Less job opportunities	Most of the inhabitants are educated	Educated individuals move out from the barangay to seek livelihood
Provided with post-harvest facilities	Technology is not adapted.		
	Crops grown need to be fertilized		
Reforestation project minimized the illegal activities in the uplands since the people are educated	Small-scale businesses (Fishing) are minimized after the marine sanctuary was established		Individuals knowledgeable on information gathered from training do not share information to others

The participants in the FGD were concerned with both economic and environmental issues confronting the barangay and could see the links between them. They were concerned with maximizing agricultural production and the employment opportunities for the residents of the barangay. They were also concerned with the state of the environment, including the threat to water supplies posed by barren watersheds that could result in damage to irrigation facilities and decrease agricultural production.

There are a number of indications that the participants felt the community was lacking in terms of management skills. Comments that the community projects risk failure through mismanagement, and that the community suffers because of the movement of professionals to urban areas both suggest that the community feels disempowered in terms of dealing with the management activities of development programs. They commented on the problems they encounter marketing some products. They also are aware of their financial status, of their lack of finance to invest in farming and post harvest processing equipment, and their lack of capital to compete with medium sized businesses.

In conclusion, it appears that the participants felt that the community has adequate natural resources to fulfil their needs and that development of the community is constrained by deficiencies in enterprise management and marketing skills, and lack of investment capital.

8.3.2 SWOT Analysis for Barangay Poting Bato, Isabel

Findings from the SWOT analysis for Poting Bato are reported in Table 9.4. Some strengths of the barangay mentioned by the participants included the large potential area for tree farming, presence of farm-to-market roads, and availability of water for all agricultural crops, especially for rice production. The participants at the FGD cited the lack of leaders to manage the community for ‘real and right direction’ towards development as one of the barangays’ weaknesses. Another is that lack of financial institutions to extend support to small farmers in their various farm activities.

Participants identified employment opportunities for community members, as the barangay is declared as one of the industrial zones in the local government area of Isabel. Some participants also noted, however, that the existence of nearby wage earning opportunities had resulted in some people neglecting their farming activities in preference for seeking wage labour. The problem is that the employment offered by the local industries is casual and sporadic, with participants reporting that most labourers only gain employment for three to four months of the year even though they travel to the site daily to seek work.

Table 8.4. SWOT analysis of Barangay Poting Bato, Isabel

Strengths	Weaknesses	Opportunities	Threats
Water pump- not only for irrigation but also for drinking purposes	Lot of professionals migrated to other places	Cooperative	No cooperation from the community, e.g. they intentionally burn the trees
Large tract of coconut land	Lack of financing	People's organisation	No proper management of the forestry program
Large tract of forested area	Lazy people	Animal dispersal (sponsored by the Department of Agriculture and PHILPHOS)	Insufficient income
Fresh air, no pollution	Low farm production	Good peace and order	No good communication among the constituents
Basketball Court was constructed	Low income	Health and family programs	
Good farm to market road	Lack of post-harvest facilities	Unusual support from the LGU	
Presence of electricity	Lack of leaders for community development	Lot of support from the provincial government for community development	
Big population	Lack of agricultural support from the government	Programs given by DENR	
Abundant manpower	No permanent technicians from the government	Large tract of forested land	
Unity between the residents and barangay officials for the welfare of the community	Lack of interest to work in the farm	Available transport	

8.3.3 SWOT Analysis for Barangay Rizal II, Babatngon

The Barangay Rizal II has several characteristics that participants regarded as strengths, including large areas of rice fields, cornfields, coco farms, a parcel of forested area, plus abundant sources of water supply and sand gravel. In terms of institutional support, participants regarded the barangay as lucky to have a Government technician from Department of Agriculture and National Irrigation Administration to properly guide and manage the implemented irrigation project. In terms of demographics, the population density is average, but the demand for labour is high. There are several projects implemented in the barangay that were accepted by the community, evidence of the high level of cooperation among community members in working for the development and improvement of the Barangay. The barangay has benefited from infrastructure development projects including the concreting of main roads, the supply of electricity, as well as various training programs and seminars for farmers (Table 8.5).

The weaknesses of the barangay in terms of biophysical factors include the loss of forest cover and the need for restoration of soil fertility. In terms demographic aspects, problems facing the barangay include the high proportion of unemployment, ~~a~~ lack of financial support for farming, and lack of production to sustain basic needs for many households. In terms of infrastructure, the barangay still lacks post-harvest facilities, many farm-to-market roads are not yet concrete, there is an absence of an Elementary School, no Health Centre, and lack of organization to determine the pricing of farm products. The opportunities of the barangay recognised by participants include the projects set-up by the government, including the infrastructure development projects. The threats include financial crisis and risks of mismanagement of development projects.

Table 8.5. Results of a strengths, weaknesses, opportunities and threats analysis in barangay Rizal II

Strengths	**Weaknesses**	**Opportunities**	**Threats**
Huge farm area for rice and corn	The forested areas are depleting	The barangay have huge land area	Financial crisis
Huge area cultivated for coconut	The farm areas need fertilizer for higher production.	The barangay is provided with infrastructure facilities	Officials from the Local Government are not working well
Forest area is huge	High population for unemployed individuals	Existence of irrigation and potable drinking water.	Laziness
Abundant water and sand supply	Individuals having an educational degree are less in the area	The national highway is concreted	Income is not sufficient for the family's food expenses for many
Presence of abundant manpower	Lack of financing for farming		
Government technician from DA and NIA are working effectively for the barangay	Agricultural products are not sufficient for the barangay.	Plenty of provided projects from the government such as : CBRMP, SEAK, Rainforestation/CBFM, ISF	Some projects are not properly monitored by the implementing agency.
Population is not increasing exponentially	Lacking post-harvest facilities for agricultural products	NGOs are also providing projects for the barangay	
People are responsive to the projects provided by the Government	Some roads from farm to market are not yet paved, especially in the interior part of the brgy.		Proposed projects are not implemented immediately by the funding agencies, especially the projects concerning financial assistance to agriculture and livelihood
People cooperate for the development and improvement of the barangay	No school building for elementary level		
The barangay has an accessible and concreted national road	No health centre		
Agricultural trainings and seminar are provided to the people in the barangay	No existing organization to monitor prices of the agricultural products		
Electricity is available in the barangay	The irrigation projects are not yet turned over to a certain organization for management.		
	Slow implementation of the government projects and poor follow-up and monitoring		

8.3.4 SWOT Analysis for Barangay Tigbao, Matalom

Findings from the SWOT analysis for Poting Bato are reported in Table 9.6. Strengths identified by the FDG participants included a high population that can provide a large labour force, the presence of an elementary school with grades from 1-6, and a high literacy level, exemplified by professionals who continue to reside in or are still connected with the barangay. Other strengths that were enumerated included: an abundant water supply; the large areas for coconut plantations and rice production, and potential for timber and fruit tree production, as illustrated in Table 9.6,. The above resource strengths are the basis of their sources of livelihood, which is dominantly farming.

The community has also identified several weaknesses that may hinder them from development. These include the remoteness of the barangay from markets, made worse by the poor road conditions, the lack of local agriculture wholesalers, the low prices for agricultural products, and constant threat from pests and diseases. Other weaknesses relate more to the community's response to government development programs and the lack of agreement within the community in terms of the directions for development, in particular the absence of a current leader for irrigation development activities. The presence of a health centre was seen as a strength of the community, but a lack of medicine for the centre was also noted.

Table 8.6. Strength, Weaknesses, Opportunities, and Threats of Barangay Tigbao, Matalom, Leyte

Strengths	**Weaknesses**	***Opportunities***	**Threats**
Abundant rice areas	Insufficient financing support	Provided with electricity	Lack of financial assistance
Most people in the barangay are farmers	Falling productivity problem (crops)	Private land-planted w/ trees	Insufficient sources of germplasm
Continuous water supply	The market place is very far from the barangay	Government programs are provided such the subsidisation of fertilizers	Roads are not concrete
Population is high	The people are not cooperative enough for the aim for development	Existing barangay roads	Programs are not fully implemented
Presence of continuing Cooperatives	People lack participation in the programs	The government provided programs for the barangay	Pest infestation in vegetables and other crops
Abundant labour force (for free or hired)	Provided with health centre but no medical supplies	Many of the inhabitants are planting vegetables	Individuals working in Manila are not providing remittances
Presence of a Department of Agriculture technician in the barangay	Less coconut fruits per tree and the price for copra is low	Walk in customers come to the barangay to buy agricultural products such as vegetables	Many are interested to cultivate lands for agriculture
There are agencies that help the barangay	No one will lead the people for the management of the water supply for irrigation	Abundant land for cultivation	Transportation fare is high
Large coconut area	Rice production is not sufficient for the whole barangay.	Some are seeking livelihood or working abroad.	
Huge area for tree farming	Pest infestation	Transportation facilities can access to the barangay	
Presence of reforestation project	No buyer of copra in the barangay		
There are existing professionals in the barangay			
Presence of health centre and the barangay is visited: midwife twice a week; doctor once a month			
Existence of elementary school (grades 1-6)			

The participants identified several opportunities they can tap for further development in the barangay. They appreciate the existence of government programs and support agencies, the recently improved accessibility of the barangay by land transportation, and presence of electricity. In terms of farming opportunities, the participants mentioned that there are still large areas of barren land, private land are already planted with timber trees, and that several community members were involved in vegetable farming. The marketing problems of farmers were being addressed to some extent by vegetable buyers who regularly visit the area. Participants saw the opportunity to solve their problems in generating capital as being overcome by the several community members who are working abroad.

The community is also facing threats that may hinder them in attaining community development. These appear to be threats that can be avoided or dealt with effectively using their strengths. The threats include: lack of financial assistance; insufficient quantity of seeds and planting materials; the risk of crop pest damage and disease in vegetables and other crops; high transportation costs; improper implementation of government programs and supports; and increase in number of interested cultivators and insufficient land areas for crop production. While the participants noted that there are large areas of arable land surrounding the barangay, they are concerned at the pressure being placed on these resources as more people seek land to cultivate in the area.

8.3.5 Comparison of the SWOT analyses

There was substantial variation in the results of the SWOT analyses between the various communities reflecting the differences in their surrounding environment, infrastructure development, community cohesion and proximity to urban markets. For instance, transport infrastructure is now reasonably good in Rizal II and Conalum but is still viewed as a weakness in both Tigbao and Puting Bato. Across all of the barangays, certain similarities can be noted in the SWOT analyses. The strengths and opportunities perceived by the participants relate to the potential productivity of the land resources, the presence of infrastructure, cooperation between community members and the existence of development projects. Weaknesses are more varied, referring to the poor implementation of development projects, laziness and lack of cooperation between people, poor conditions for tenants, decline in the health of the environment, and continued lack of some basic infrastructure in some communities. The risk of mismanagement of development projects and slow implementation of projects was also consistently identified. The threats refer largely to factors that are outside the control of the communities including typhoons and financial crises. Some of the threats refer to factors also listed as weaknesses, such as lack of community cooperation, and the out-migration of the professionally educated members of the community. The lack of access to credit facilities was mentioned consistently as a constraint to development in the barangays. The potential to generate capital from working overseas was also mentioned consistently as a potential solution to the lack of capital in these communities.

8.4 REASONS FOR AND CONSTRAINTS TO TREE PLANTING AND MANAGEMENT

To assist in the construction of 'closed' questions for the household interviews the participants were asked to list the reasons they have for and constraints to planting and managing trees. The responses for each of the communities are presented in Table 8.7. There are many reasons why people in the barangay want to plant trees, with the common answers from the participants being:

- to provide housing construction materials;
- for the benefit of the future generations;
- to revive the water supply (address low water levels);
- to revive the forest conditions (biodiversity conservation and soil fertility);
- to provide a source of income; and,
- to protect against disasters and natural calamities such as landslides and floods.

The concern about the future generations related not only to concern that the next generation can utilize the trees in the future. Participants were also concerned about providing a healthy environment in general. In regards to environmental conditions, the participants' desire to plant trees to improve the condition of forests was common, as was concern about the falling water level of their rivers, which they also wanted to improve through tree planting.

Table 8.7. Reasons for and constraints to tree planting and management (All Sites)

Brgy. Conalum		Brgy . Tigbao		Brgy. Puting Bato		Brgy. Rizal	
Constraints	*Reasons*	Constraints	Reasons	Constraints	Reasons	Constraints	Reasons
Not a member of any organization pertaining to tree planting Unavailability of land for tree planting No seedling available Lack of knowledge on to what trees will be planted on a particular area Lack of knowledge on the importance of trees Strict policy implementation on cutting of trees Long gestation period	Additional income Low price if the supply is abundant Shade for abaca Fresh air For future purposes Role model for the youth Water sources Wildlife habitats (e.g. monkeys, birds, flying lemur) Prevents floods / calamities For house construction materials	Financial Labour force Unavailability of germ plasm	For house construction materials Prevent soil erosion Additional water supply Sources of income Enhance soil fertility To avoid forest fires Beautification Restore natural resources For the future of their children	Unavailability of land area No seedling available Lazy Long gestation period Lack of interest Easily wind blown Afraid to plant trees near the house Saplings are easily grazed Lack of knowledge on planting trees Income not enough to buy fertilizers Lack of capital to support tree planting Poor timber market	For house construction materials It can be a good business and collateral for loans Provide shade Restore sources of water Can loan help to others by sharing some of the timber Prevent soil erosion Enhance soil fertility For the next generation	Financial Unavailability of seedlings Lazy Lack of knowledge pertaining to tree planting Poor market Lack of interest to plant trees Strict implementation of policies on harvesting trees Long gestation period	Registered trees give revenue/tax to the government Prevent land slide Roots enhance water supply Self satisfaction Serves as model for future generation Prevents floods Provides shade Restores fresh air Many products can be derived

The farmers believe that the planting of trees near or in their farms would improve the fertility of their soil, and that landslides and floods could be avoided if trees are planted on the critical areas which are prone to landslides. Other common responses were that trees can be a source of income, and used for housing materials. Other reasons that were mentioned by participants for tree planting, including:

- to provide shade for other crops (particularly Abaca);
- to decrease the prices of tree products with an increase in the supply of trees;
- to avoid forest fires; and,
- to educate younger people about the importance of trees.

For abaca farmers, trees can provide appropriate shade for cropping in their cultivated lands. Some participants mentioned the market conditions of the supply and the demand of trees and timber, observing that if the supply of trees increases the prices for tree products will go down. Some FGD participants had already experienced fires and wanted to avoid them through tree planting. Lastly, the participants said that the planting of trees is not only for economic and environmental improvement, but also to increase the awareness of younger individuals in the barangay.

The participants mentioned a number of constraints that hinder people from planting and managing trees. The most common constraints mentioned include:

- lack of availability of the planting materials;
- lack of available land to plant;
- lack of knowledge and technology about tree planting and management;
- lack of finances to purchase labour services and materials needed for tree planting;
- uncertainty about the policies pertaining to forestry; and
- the long time taken for trees to reach harvest age.

The financial constraints could apply to both individual farmers or to organizations. The financial capacity of many farmers is insufficient to purchase the materials and labour required to establish tree plantations. For the community organisations, the release or mobilization of funds by development agencies or those managing development funds is frequently not in a timely manner. Forestry policies are seen as creating difficulties, especially when harvesting, because many technical requirements must be fulfilled before households and organisations can obtain a permit to cut trees.

Other constraints to tree planting and management reported include:

- selective membership policies of some of the community organisations;
- difficulty in marketing of the tree products; and
- the low interest of the people towards tree planting.

8.5 SPECIES OF TREES PREFERED BY PARTICIPANTS

Participants were asked to list their preferred species of trees to grow on their land. The participants from the four communities combined mentioned more than 60 species (Table 8.8).

Table 8.8. Preferred tree species of participants in the initial focus group discussions

Fruit tree species	Forest tree species	Possible products from trees
1. Kaimito	1. Narra	1. Atop
2. Boongon	2. Bagalunga	2. Sakayan
3. Atis	3. Gmelina	3. Tulay
4. Sabana	4. Mahogany	4. Balay
5. Lansones	5. Mangium	5. Bangko
6. Bayabas	6. Rubber tree	6. Lamisa
7. Chicos	7. Tugas	7. Tinidor
8. Mandarin	8. Anislag	8. Kutsara
9. Orange	9. Pine tree	9. Litson tray
10. Boongon	10. Falcata	10. Desk tray
11. Atis	11. Red and White Lauan	11. Display
12. Sabana	12. Molave	12. Furniture
13. Guyabano	13. Bagras	13. Lungon
14. Lemonsito	14. Antipolo	14. Divider
15. Avocado	15. Neem tree	15. Bakya
16. Tambis	16. Bangkal	16. Sandal
17. Santol	17. Bayong	17. Frutas
18. Sunkist	18. Ipil-ipil	18. Guitar
19. Nangka	19. Rain tree	19. Seeds
20. Mabolo	20. Taluto	20. Tambal
21. Mango	21. Bagtikan	21. Gum
22. Caimito	22. Yakal	22. Oling
23. Jackfruit	23. Ayuhan	23.Sugnod gatong/ campfire
24. Rambutan	24. Patsaragon	
25. Durian	25. Toog	
26. Macopa	26. Anagasi	
27. Guava	27. Kamangag	
28. Starapple	28. Apitong	
29. Coconut	29. Kamagong	
30. Pomelo	30. Mancuno	
31. Pili		
32. Marang		

In general they mentioned a slightly greater number of fruit tree species relative to forest (or timber) tree species. Some of these fruit trees are multi-purpose species, including mango and jackfruit, and can provide high quality timber as well as fruit. Participants in the focus group discussions were able to identify more than 20 potential products to make from timber trees. While there are a number of exotic species in the list of fruit and timber species, most (21 out of 29) are native species, and almost half of these have the potential to provide premium quality timber (Table 8.9).

Table 8.9: Origin and timber quality of tree species mentioned by participants at the initial community focus group discussions

Species local name	Scientific name*	Origin	Type
Anagasi	Leucosyke capitellata	Native	Non-premium
Anislag	Securinega flexuaosa	Native	Non-premium
Antipolo	Artocarpus heterophylla	Native	Premium
Apitong	Dipterocarpus grandiflorus	Native	Premium
Ayuhan	Unknown	Native	?
Bagalunga	Melia dubia	Native	Premium
Bagras	Eucalyptus deglupta	Native	Premium
Bagtikan	Parashorea plicata	Native	?
Bangkal	Nauclea orientalis	Native	Non-premium
Bayong	Afzelia rhomboidia	Native	
Falcata	Albizia falcataria		
Gmelina	Gmelina arborea	Exotic	Premium
Ipil-ipil	Leucaena spp.	Exotic	Premium
Kamagong	Diospyros philippinensis	Native	
Kaningag	Cinnamomum mercadoi	Native	Medicinal
Mahogany	Swietenia macrophylla	Exotic	Premium
Mancuno	Unknown	Native	Premium
Mangium	Acacia mangium	Exotic	Premium
Molave	Vitex parviflora	Native	Premium
Narra	Pterocarpus indicus	Native	Premium
Neem tree	Melia adzedarach	Exotic	
Patsaragon	Unknown	Native	Non-premium
Pine tree	Pinus spp.	Exotic	
Rain tree	Unknown	Exotic	Premium
Red and White Lauan	Shorea spp.	Native	Premium
Rubber tree	Ficus spp.		
Taluto	Unknown	Native	Non-premium
Toog	Combretodendron quadrialatum	Native	Premium
Tugas	Vitex parviflora	Native	
Yakal	Shorea malibato	Native	

Notes: *Scientific names from Lawrence and Mangaoang (1999) and Ponce and Bangi (1988).

8.6 PREVIOUS EXPERIENCES WITH COMMUNITY FORESTRY PROGRAMS IN THE COMMUNITIES PARTICIPATING IN THE RESEARCH

Each of the communities involved in the research project have had some experience with community forestry programs. The most successful the communities, in terms of the time that the program has operated, and the achievements of the project as measured by the area of land reforested, are the communities of Rizal II and Conalum. The community forestry projects in the communities of Tigbao and Poting Bato have been less successful for various reasons. Regardless of their success, members from each of the communities have thus had the experience of creating community organisations, running tree nurseries, and establishing of trees in the field.

Rizal II

The Integrated Social Forestry Program (ISF) started in 1994 in Rizal II. The project was designated as the pilot project for the region, but all the ISF projects have been devolved to the responsibility of the LGUs. The peoples organisation (PO) in the community, known as the Rizal Upland Developers Association, Inc. (RUDA), was established in December 1999, and was registered with the Security of Exchange Commission on May 20, 2000.

The Rizal Upland Developers Association (RUDA) has been awarded by the Community Based Forest Management Agreement (CBFMA) covering an area of 500 ha. This area includes the 'Rainforestation' area of 200 ha sponsored by the GTZ (German Tropical Ecology Program) of the German government, and previous Integrated Social Forestry area of 300ha.

The RUDA was initiated by DENR. The organization arose because of the necessity maintaining its Rainforestation project. Initially this project was under the guidance of the NGO Visayan Association for Livelihood and Upliftment of Ecological Systems (VALUES), whose task included the development and protection of the project site. The NGO formed an organization, the Rizal Integrated Social Forestry Farmers Association (RISFFA) to serve as labour force, responsible for the planting and development of the project site. The members of this organization are the farmer-beneficiaries of Integrated Social Forestry project. When the contract of VALUES was terminated, the DENR project personnel advised the ISF holders to organize an association so that they could access funds for the maintenance of the Rainforestation project, a project sponsored by the GTZ. Thus the maintenance of the Rainforestation Project in Babatngon is funded by DENR Region.

The Rainforestation project site covers a 200 ha area of logged-over dipterocarp forest. The project is located adjacent to an area that was targeted for reafforestation by (V. Eurotrade

Limited, an Industrial Forest Management Agreement (IFMA) holder). The community organisation has remained active, even though the nursery has not been active since 2001 There was no formal training conducted by the community organizer for RUDA. The whole 200 ha Rainforestation area was revegetated with various diptirocarp species found in the area. The method of planting was assisted natural regeneration. This Rainforestation project was aimed at showcasing the aesthetic value of the natural rainforest and hence it is expected that harvesting in this area will be strictly prohibited. The adjacent ISF area of about 300 hectares was awarded to RUDA as part of the CBFMA, and in this area that utilization of fallen logs and minor forest products is allowed.

Conalum

The community forestry program in Conalum has received support from various sources, including World Vision, the Department of Environment and Natural Resources and, more recently, the ACIAR Smallholder Forestry Project. Two Community Organizations (COs) are in operation in Conalum. The *Kapunungan sa mga Yanong Mag-uuma sa Kakahoyan sa Inopacan* (KAHOI) was organized in 1997 by the NGO Partnership for Ecological Orientation and Preservation of Leyte's Environment Inc. (PEOPLE'S) as a Community-Based Forest Management (CBFM) peoples' organization. This CO was successful in planting out an area of approximately 100 ha in the upland portion of the barangay in the years 1992-1993. The species used was *Gmelina arborea* with few stems of *Acacia mangium*. They were given a Community-Based Forest Management Agreement (CBFMA) in year 2000. A request for resource inventory filed by KAHOI is pending at the Baybay Sub-CENRO during the conduct of the interview. The resource inventory will form part of the Resource Use Plan (RUP) of the CBFM area.

The second CO operated in the lowland parts of the barangay. The Conalum Agroforestry Association (CAFA) was organized in the year 2000. The CAFA is a PO initiated by World Vision, whose task is to establish fruit and forest trees plantation on member's farm. Other livelihood projects involving aquaculture (lapu-lapu) were also proposed. The organization was not able to register with the LGU since another organization holding CBFMA already exists in the barangay. The assisting NGO decided to merge the organization to the existing cooperative, the CAFAMACO, also assisted by World Vision, for the purpose of official registration to the LGU and to get legitimate funding. The few activities undertaken coupled with long intervals between organizational meetings reduces members' enthusiasm to participate in their activities. A serious incident occurred in 2002 when the person charged with purchasing fruit tree seedlings, to plant in an area that had newly-established Bagras seedlings, disappeared with P30,000 of the organisations funds. The result has been the decrease of the number of members to 17, from an original number of 24. Nevertheless, the remaining members are active and progressing their activities. Current activities include tree growth trials with staff from the College of Forestry using various species, and experimentation in nursery practice requirements for seeds of indigenous tree species collected by community members from remnant forest.

Tigbao

The main function of the Waterloo, Anahaw, Lunas, Lowan, Tigbao Reforestation Beneficiary Association (WALLTREBA Inc.) is to reforest the 1,560 hectares denuded timberland of the area. The community organisation has members from five communities that border the forestland. Native forests were largely cleared from the area in 1972. The CO had secured an agreement with DENR to undertake reforestation on the cleared timber lands in 1995-1998.

The community organiser was employed by VALUES. The community organizers built a house for the organisation where training activities were held and a nursery maintained. The members of the organisation commenced planting in 1995 but ceased activity when funding for the program was withdrawn by the ADB. The ADB withdrew their funding following a national review of the program. The review had found that many of the projects had failed to meet deadlines for undertaking certain activities and the contract between the ADB stated that certain areas of planting had to occur within set time periods or the contract would be void. The community argue that they were forced to stop planting and failed to meet deadlines in the contract because of the El Nino event at the time, which had led to a severe drought. The community members argued that if they had of continued to plant, trees would all have died. As a result only approximately 55 ha of land were reforested out of a potential area of approximately 300 ha under the contract. A number of the community members have expressed interest in getting access to the land for farming and forestry purposes.

Poting Bato

The Poting Bato Reforestation Association (PRA) was formally organized in December 1995. The Assisting NGO was Visayan Association for Livelihood and Upliftment of Ecological Systems (VALUES) Inc. At the conception of PRA a total of 50 households were official registered as members of the association. But during the survey only half of tem were active. A series of lectures, training and seminars were conducted by VALUES as part of the organizing activities over two years. Aside form these seminars and lectures, the NGO also assisted the construction of multipurpose hall which serves as the training hall and office for the PO and NGO. Community organizers (COs) had lived in the barangay for the duration of the organizing process.

A total of 284 ha of denuded forest lands were targeted by PRA with funding from the Asian Development Bank Loan II for community forestry development. Of the 284 ha targeted in the project, only 33 ha were planted to mahogany, mangium and bagalunga in 1996. In the year 2000, a forest fire damaged about ten hectares of the established plantation which they immediately replanted with the same tree species planting spacing. It is estimated by the PO leader that the mahogany will be harvested at age 25 years and the mangium and bagalunga between the ages of 15-20 years old. Current activities of the organization is basically monitoring and replanting.

As stated in the CBFMA income from all harvesting operation will be distributed accordingly to ADB: 30 %, PO: 45% and claimant: 25%. The harvesting operation will be assisted by the DENR CENRO office at Albuera on the west coast of the Island.

8.7 SUMMARY

The focus group discussions held in the communities generated a number of insights into the history of use and present status of the natural resources and socioeconomic infrastructure of the communities. Details were gathered concerning the views of the community about the present status of resources in the community and development needs, similarities and differences in and between the communities in terms of households' relative well-being, and the types of functions that households perceive as important for tree planting and management activities.

Participants from each of the communities reported similar patterns of change in the status of the natural resources in their areas, similar changes in the social relations in the communities and some similarities in the development of the education, transport and health care infrastructure of the communities. The changes in the natural resources included the loss of forest resources and the degradation of waterways, while the social relations had changed in that people now apparently have less respect for the rule of law in the barangays despite the democratisation of barangay leadership. While all of the communities reported that the infrastructure in their communities had been improved, they remained concerned that some of the developments are not, like the community health centres, able to fulfil their functions properly due to a lack of operating funds.

The discussions about the well-being categories within the communities revealed that there is substantial variation within communities in terms of their control of productive resources, their sources of livelihood and their attitudes to work and education. In regards to the possibilities for the development of the community, the opportunities provided by national and international agencies were universally appreciated, but the potential problems of mismanagement of these programs were also widely recognised. Common concerns were that the community members lack the bureaucratic skills to manage these programs and that people lose interest in the programs when there are delays in payments they rely on for their livelihood. These concerns reinforce the conclusions of reviewers of these programs that were described in earlier chapters.

The community's experiences with community forestry programs have been varied, ranging from relatively successful operations in Rizal II and parts of Conalum, to less successful projects in Poting Bato and Tigbao. The varied challenges to the success of the projects in these communities reflect the myriad of issues that constrain the success of community based forest management across the Philippines reviewed in Chapter 7. The sources or causes of many of these challenges are beyond the control of the community members, including droughts, typhoons and regional financial crises. Some communities have experienced funding problems that were also outside their control, including the withdrawal of the ADB funds for the CO in Tigbao, and the theft of funds from one of the COs in Conalum. The difficulty of sustaining members interest in COs which lack short term and ongoing revenue raising potential was commonly recognised.

The participants in the FGDs recognised many potential benefits from tree planting and management activities for the environment as well as the social and economic development of the communities. The participants were familiar with many species that could be grown in their areas, and many potential products that could be produced from these tree species. They also perceived a number of constraints that prevent them from expanding their tree management activities, the most common responses including a lack of land for such activities, a lack of germ plasm for planting, confusion about the regulation of tree planting and harvesting activities, and financial constraints to tree establishment. Thus far a limited picture of the variation within and between the communities in terms of their socioeconomic characteristics and their tree planting and management attitudes and behaviour has been developed. In the following chapters this variation is explored in detail through the analysis of responses to the household interviews.

Chapter 9

SOCIO-DEMOGRAPHIC CHARACTERISTICS AND DEVELOPMENT PRIORITIES OF RURAL HOUSEHOLDS IN LEYTE PROVINCE

In order to understand the variation between rural households, the factors that affect their forestry preferences and how targeted tree management can be developed to assist rural households in Leyte province, it is necessary to examine their socio-demographic characteristics. This chapter provides a summary of the responses to the household survey concentrating on the socioeconomic characteristics of the households, with the description of the responses to the various questions presented per community, together with the averages of the responses from all communities where appropriate.

9.1 DEMOGRAPHIC CHARACTERISTICS OF RURAL HOUSEHOLDS IN LEYTE PROVINCE

The age and family structure of the households in the communities varies from extended families, to nuclear and single parent family structures, plus some elderly households. On average there are five members per household across all communities, with slightly higher numbers in Tigbao and Poting Bato relative to the other communities (Tables 9.1 and 9.2). These communities have slightly higher numbers of young adults and elderly people relative to the other communities (Table 9.1).

Table 9.1. Average number of people in each household age class in the participating communities

Community	Below 12	12 to 20	20 to 35	35 to 50	50 to 65	over 65	Mean total
Conalum	1.1	1.6	1.6	1.4	1.4	1.1	4.9
Poting Bato	1.6	2.3	1.4	1.5	1.5	1.6	5.2
Rizal II	1.9	1.7	1.4	1.6	1.5	1.5	4.6
Tigbao	2.0	1.9	1.6	1.5	1.3	1.5	5.2
Average	1.6	1.9	1.5	1.5	1.4	1.4	5.0

Table 9.2: Household size and number of children not at school in the participating communities

Variable	Community	Number of cases	Mean	Standard Deviation
Average number of members per household	Conalum	52	4.9	2.23
	Poting Bato	51	5.2	2.17
	Rizal II	50	4.6	2.23
	Tigbao	50	5.2	2.37
	Average	203	5.0	2.25
Number of children under 12 not at school	Conalum	48	0.6	.85
	Poting Bato	47	0.7	.81
	Rizal II	48	0.9	1.18
	Tigbao	47	0.8	1.07
	Average	190	0.7	1.00

One way ANOVA tests indicated statistically significant differences between the communities in terms the average number of children per household (d.f. = 3, F = 3.411, p=0.019). Post hoc tests for multiple differences in the means (the Tamhane test) indicated that the average number of children per household is lower in Conalum than in Tigbao (p=0.027) and Rizal II (p=0.05).

Respondents were asked to indicate the highest level of formal education achieved by each of the household members. The data were then summarised by calculating the highest level of formal education in the household (Table 9.3). Just over half the households surveyed have at least one member with high school education, one quarter have no members with greater than elementary school education as the highest level achieved, and 15% have some college education.

Table 9.3. Proportion of households in all participating communities with various categories of highest education in household

Level of formal education	Frequency	Relative frequency (%)
None	1	0.5
Elementary	56	27.6
High school	113	55.7
College	30	14.8
Post graduate degree	3	1.5
Total	203	100.0

Two of the categories illustrated in Table 9.3 have less than five respondents and are unsuited for inclusion in statistical testing for relationships with other variables. Therefore the variable was recoded for subsequent testing with the removal of the one household that reported having no members who had completed primary education, and by combining the postgraduate degree category with the college category. Using these categories differences were found between the communities in terms of the highest educational attainment in the household (d.f. = 6, chi square = 18.590, p = 0.005) (Table 9.4).

Table 9.4. Proportion of households with various categories of highest education in the household in the participating communities

	Highest formal education level			
Community	Elementary	High school	College or postgraduate	Total
Conalum (%)	16	61	24	100
Poting Bato (%)	49	39	12	100
Rizal II (%)	26	62	12	100
Tigbao (%)	20	62	18	100
Average (%)	28	56	16	100

Differences between the communities that stand out in terms of educational attainment include that half the households in Poting Bato have only elementary education, approximately twice the rate of the other communities, with a corresponding decrease in the number of households with high school education. On the other hand, households in both Conalum and Tigbao have higher proportions of people with college and post-graduate education.

The level of formal education of all people aged over five years in each household was also calculated to enable comparison of the education levels within the sample with those provided by the national statistics bureau. As reported in Table 9.5, the proportion of people with an elementary education level in the sample is similar to that of the overall region. Slight differences between the sample and the region are found with a greater proportion of people having high school education, and lower proportions having college and post-graduate educations. The apparent under-representation of those in the highest education categories could be due to general differences between urban and rural areas. In other words it could be expected that those with higher education levels would tend to migrate to urban areas so as to take advantage of employment opportunities available to them there.

Table 9.5. Proportion of respondents (sample) and population of Region VIII aged over five years with various levels of formal education [a]

Highest education category	Proportion in sample (%)	Proportion in region VIII[a] (%)
Elementary education	52.24	51.67
High school level	27.21	22.74
College education	5.25	7.69
Postgraduate education	0.33	3.56

a. Source: National Statistics Coordination Board (NSCB) 2003.

9.2 HOUSEHOLD CASH INCOME

One-way ANOVA tests revealed differences between the communities in terms of the average gross yearly income of the responding households (d.f.= 3, F = 2.724, p = 0.045). Multiple comparison post-hoc tests (Bonferroni method) for the sources of the difference indicated that households in Poting Bato have lower average gross yearly income than the respondents from the other communities. The size of the standard deviation for the means of the communities and for all respondents indicates substantial variation within communities as well as between them (Table 9.6).

Table 9.6. Average household gross yearly income in the participating communities (Ph.Pesos) [1]

Community	N	Mean (PhP)	Median (PhP)	Mean centred coefficient of variance (%)
Conalum	52	58,457.6	42,380	94
Poting Bato	51	32,883.5	21,400	96
Rizal II	50	57,331.3	41,110	96
Tigbao	50	57,403.3	34,585	117
Average	203	51,495.5	36,400	106

[1] The exchange rate is approximately US$1 = PhP50

Estimated community median annual incomes were similar for all communities except Poting Bato, at about PhP 7,500 - P10,000, while the median for Poting Bato was much lower, at about PhP 4,300, indicating a greater depth of poverty for households there (Table 9.7). Again the size of the mean centred coefficient of variance indicates that there is substantial variation within each of the communities in terms of the average income per household member.

Table 9.7. Average income per capita by in the participating communities (Ph. Pesos)

Community	N	Mean (PhP)	Proportion of households below regional poverty threshold	Minimum (PhP)	Maximum (PhP)	Median (PhP)	Mean centred coefficient of variance (%)
Conalum	52	19,053	61.5	914	143000	7,723	153
Poting Bato	51	8,179	78.4	0	45733	4,380	121
Rizal II	50	14,764	54.0	0	64100	9,158	96
Tigbao	50	15,784	58.0	796	219770	7,099	197
Average	203	14,459	61.3	0	219770	7,091	160

NSCB (2003) reports an estimated annual average family income for households in Leyte in year 2000 of P91,520, with a per capita poverty threshold of P10,287. Using this threshold it was estimated that 50% of households in Region VIII are below the poverty threshold (Table 9.8). Poverty threshold estimates by Balisacan (2001), based on expenditure rather than income, indicate that all the provinces on the adjacent islands of Samar and Biliran are among the poorest 10 in the Philippines, but those in Leyte are not in these 10. Thus poverty is prevalent throughout the region being studied, and the households in the communities that are being studied have higher proportions of households below the poverty threshold than the regional average for rural areas.

Table 9.8. Average annual income by region and provinces and poverty thresholds and incidence by region

Statistic	Region 8	Leyte	Southern Leyte
Average annual family income (2000) (Ph. P)	91,520	106,567	85,623
Annual per capita poverty threshold (2000) (Ph. P)	10,783		
Urban (Ph. P)	12,011		
Rural (Ph. P)	10,287		
Poverty incidence of families (2000) (%)	43.6		
Urban (%)	27.1		
Rural (%)	50		

Source: NSCB (2003).

Respondents were asked to indicate the sources of their income as well as the gross level of income from each source (Table 9.9). On average respondents derive approximately 40% of their income from farming (including fishing in the case of some Conalum residents). Respondents from Tigbao reported higher proportions of their income from farming (46%) than the other communities (which averaged approximately 40%), although this difference is not significant at the 95% confidence level (Table 9.9).

Table 9.9. Average and median levels of income per year per household from various sources in the participating communities

Income source	Community	N	Mean	Median	Mean centred coefficient of variance (%)
Farming - total cash income (PhP)	Conalum	51	21,092	13,500	95
	Poting Bato	52	12,659	9,000	92
	Rizal II	50	14,372	10,500	88
	Tigbao	50	22,966	17,889	63
	All respondents	181	17,607	13,900	88
Remittance amount received average per year (PhP)	Conalum	38	13,520	5,000	168
	Poting Bato	39	2,071	0	118
	Rizal II	36	4,100	0	183
	Tigbao	30	16,917	6,000	130
	All respondents	143	7,708	500.00	220
Livestock income (PhP)	Conalum	28	4,504	2,200	179
	Poting Bato	20	5,770	4,400	112
	Rizal II	40	1,664	0	308
	Tigbao	30	2,372	1,500	158
	All respondents	118	3,794	1,500.00	158
Proportion of income from farming or fishing (%)	Conalum	52	40.0	28	-
	Poting Bato	50	39.5	31	-
	Rizal II	49	40.0	27	-
	Tigbao	50	51.9	49	-
	All respondents	201	42.8	35	-

Many of the households in the communities receive money from family members working outside the community in the cities or overseas (Tables 9.9 and 9.10). Significant differences were observed between communities in terms of the proportion of households receiving remittances (d.f. = 3, Pearson Chi-Square = 32.538, p = 0.000), and the average amount received (Table 9.11). Those in Poting Bato receive substantially less income from remittances than those in the other communities (Bonferroni test for multiple differences, $p < 0.005$), and the mean amount received as remittances by households in Conalum is also greater than the amount received by households in Rizal II. Almost two thirds of households in Conlum receive remittances compared to just 12% of households in Poting Bato. Significant differences were found between the communities in terms of the total level of income from farming and the average total amount of remittances received by the households (Table 9.9). In terms of the total farming income, those households in Tigbao have higher incomes than those in Poting Bato (Bonferroni test for multiple differences, p = 0.013).

Table 9.10. Whether household receives remittances in the participating communities

Community	Yes (%)	No (%)	Total (%)
Conalum	65	35	100
Poting bato	12	88	100
Rizal II	34	66	100
Tigbao	46	54	100
Average	39	61	100

Table 9.11. ANOVA tests for differences in income levels and income sources in the participating communities

Variable	Sum of Squares	df	Mean Square	F	Sig.
Remittance amount average per year	4.509	3	1.503	3.501	0.020
Farming income total	2.104	3	0.701	3.343	0.021

The respondents were asked to nominate a main occupation for each person in the household. The responses are reported in Table 9.12. The most commonly reported occupations were farming and house-keeping, followed by labouring. There were too few responses for analysis of differences between the communities with the number of categories used. Some of the differences appear to be the low proportion of high school students in Poting Bato and higher proportion of labourers, and the lower number of sari sari stores in Poting Bato and Tigbao. This is probably due the major roads that run through Rizal II and Conalum but not the other communities.

Table 9.12. Frequency of types of main occupations of household members in the participating communities

Occupation	Conalum (%)	Poting Bato (%)	Rizal II (%)	Tigbao (%)	Average (%)
Farmer	31	45	30	42	37
House-keeping	21	22	25	22	23
Student - high school	23	11	21	20	19
Labourer	10	18	11	10	12
Sari sari operator	8	3	8	2	5
Student - college	4	0	4	3	3
Fisher	2	0	1	0	1
Multi-cab driver	0	0	1	2	1
Put put driver	0	1	1	0	0

Notes: A put-put is a tricycle available for hire to carry goods or people; a multicab is a small utility vehicle licensed to carry people within and between towns: a sari sari store is a small grocery store found in residential neighbourhoods.

Respondents were also asked to list the 'other' occupations undertaken by members of the households. As reported in Table 9.13 farming and fishing activities dominated these responses, followed by trade related occupations and small business operation, then labouring.

Table 9.13. 'Other' occupations undertaken by members of households in the participating communities

Occupation	Conalum (%)	Poting Bato (%)	Rizal II (%)	Tigbao (%)
Farming/fishing	64	49	59	59
Tradesperson or small business	25	27	20	11
Labourer	10	18	14	21
Community leader	2	5	7	8
Total	100	100	100	100

The variation in per capita income levels within communities was examined by calculating Gini coefficients[1]. A Gini coefficient of zero indicates perfectly equal incomes and a coefficient of one indicates perfect inequality. The Gini coefficient for the per capita income in the Philippines fell slowly for the period 1961 to 1988 from 0.465 to 0.445. It has actually increased since that time, however, implying that income inequality is growing in the Philippines. [1]Reyes (2000) reported a Gini coefficient of 0.487 for the Philippines for 1997. In Leyte province the Gini coefficient is higher than the national average at 0.522 (Asia Society 2003). The Gini coefficient for the communities involved in the survey range from 0.42 to 0.45 which is closer to the national average than the average for Leyte province (Table 9.14)

Table 9.14. Gini coefficients for household cash income in the participating communities

Community	Gini coefficient of cash income
Conalum	0.42
Puting bato	0.44
Rizal II	0.44
Tigbao	0.45
All communities	0.46

9.3 LEVELS OF FOOD SELF-SUFFICIENCY

A second measure of the livelihood or well-being of the households investigated in the

[1] The Gini Coefficient is calculated by comparing the distribution of income (or land) that is controlled by various quintiles within a community.

household survey was the proportion of food requirements that they are able to produce themselves. Respondents' estimates of the proportion of staple foods (rice and or maize) they produce themselves are reported in Table 9.15, and estimated proportions of the household total food requirements they produce themselves are reported in Table 9.16. Respondents were asked to nominate one of four categories rather than give an exact estimate.

Table 9.15. Proportion of staple food needs grown by the household by percentage of respondents in each community

Community	Proportion of staple food needs grown by the household (%)				
	0 - 25%	26 - 50%	51 – 75%	76 - 100%	Total %
Conalum (%)	44	10	21	25	100
Poting Bato (%)	43	22	18	18	100
Rizal II (%)	70	8	12	10	100
Tigbao (%)	26	34	22	18	100
All respondents (%)	46	18	18	18	100

Differences were found between communities in terms of the proportion of staple food produced by households (d.f. = 9, Chi Square = 27.844, p = 0.001), and in terms of the proportion of total food requirements produced by the households. Households in Tigbao and Conalum reported that they are able to produce a greater proportion of their staple and total food needs than households in Rizal II and Poting Bato.

Table 9.16: Percent of households in each community who grow various proportions of total their total food needs

Community	Percentage of total food needs grown by the household (%)				
	0 – 25%	26 – 50%	51 – 75%	76 – 100%	Total %
Conalum (%)	38	23	27	12	100
Poting Bato (%)	53	25	18	4	100
Rizal II (%)	66	24	6	4	100
Tigbao (%)	42	18	22	18	100
All respondents (%)	50	23	18	9	100

9.4 TYPES OF HOUSE CONSTRUCTION MATERIALS

The survey examined the types of materials used in household construction, with material classed as 'light' (usually bamboo, with grass or palm thatching), 'mixed' (commonly wood and or concrete with some light materials), and 'concrete' (where the majority of the house walls are made from concrete). Significant differences in construction materials were found between communities (d.f. = 6, F = 33.928, p = 0.000). In the case of Conalum, half the households surveyed have houses that were constructed with concrete, contrasting with the situation in Poting Bato and Rizal II where half the households interviewed have houses that were constructed with light materials (Table 9.17).

Table 9.17. Percent of respondents from each community whose house is constructed with various types of materials

Community	House construction materials Light materials	Mixed materials	Concrete	Total
Conalum (%)	21	29	50	100
Poting bato (%)	53	41	6	100
Rizal II (%)	50	26	24	100
Tigbao (%)	36	46	18	100
All respondents (%)	40	35	25	100

9.5 LANDHOLDING AND FARMING CHARACTERISTICS

Respondents were asked a number of questions regarding their land management practices. Households commonly have more than one land parcel they either own or lease which are used to produce food or cash crops (Table 9.18).

Table 9.18. Number of farming plots used per household in the participating communities

Community	0	1	2	3 or more	Total
Conalum (%)	0	31	40	29	100
Poting Bato (%)	10	35	41	14	100
Rizal II (%)	2	62	30	6	100
Tigbao(%)	0	16	36	48	100
All respondents (%)	3	36	37	24	100

The number of farming parcels controlled by each household varies significantly between communities (d.f. = 9, Pearsons chi square = 49.081, p = 0.000). Households in Poting Bato, and to a lesser extent Rizal II, have less farming parcels than those in Conalum and Tigbao.

The number of households that own some portion of the area they manage varies significantly between the communities (d.f. = 3, Pearsons chi square = 20.546, p = 0.000, Table 9.19). Households in Poting Bato are the least likely, and those in Tigbao are most likely, to own at least some of the land they manage. It should be noted that this question was difficult to administer as few households have official titles of land ownership. It was decided to rely on the self-assessment by the respondents to classify the responses. In other words, if respondents said they owned a plot of land it was accepted as true rather than asking for proof in the form of a land ownership certificate.

Table 9.19. Proportion of households in the community's who own some farm land

	Whether own some farm land		
Community	Yes	No	Total
Conalum (%)	67	33	100
Poting Bato (%)	31	69	100
Rizal II (%)	58	42	100
Tigbao (%)	72	28	100
Average (%)	57	43	100

The average area of farming land controlled by the responding households is approximately 3 ha (Table 9.20). They own approximately 1.4 ha of this land, on average 0.2 ha of which is suitable for some rice growing, and rent or lease the rest. All of the communities have high mean centred coefficient of variance measures for the size of land managed an owned by the household, indicating a high degree of variation within the communities. The one exception where the coefficient of variance is below 100% is the case of the total size of land managed by households in Tigbao. The mean size of land managed by households in the communities is consistently higher than the median, indicating that the distribution of land is negatively skewed.

Table 9.20. Mean landholding size of various types in the participating communities

Land type	Community	N	Mean (ha)	Mean centred coefficient of variance (%)	Median (ha)
Size of all land controlled by the household (ha)	Conalum	52	2.36	118	1.38
	Poting bato	45	2.18	137	1.00
	Rizal II	49	4.71	148	3.00
	Tigbao	50	2.38	78	2.25
	All respondents	196	2.91	145	
Own land size per household (ha)	Conalum	52	1.35	191	0.50
	Poting Bato	51	0.61	232	0.00
	Rizal II	50	2.40	240	0.75
	Tigbao	50	1.42	128	1.00
	All respondents	203	1.44	234	
Rice land managed, area per household (ha)	Conalum	52	0.35	181	0.00
	Poting Bato	51	0.52	253	0.00
	Rizal II	50	0.64	179	0.00
	Tigbao	50	0.88	146	0.50
	All respondents	203	0.60	189	

There are significant differences between the communities in terms of their farming activities and tenure patterns. There are differences in the mean size of land managed by households in the participating communities, as evidenced by the results of ANOVA tests for differences in the means presented in Table 9.21. Households in Rizal II manage larger areas of land than households in Poting Bato and Conalum (Bonferroni test for multiple differences, $p<0.010$), and households in Rizal II own larger areas of land than those in Conalum (Bonferroni test for multiple differences in the means, $p = 0.010$).

Table 9.21. Results of ANOVA tests for differences between participating communities in the mean size of land of various types managed by households

		Sum of Squares	df	Mean Square	F	Sig.
Land size	Between Groups	3.283	3	1.094	5.115	.002
	Within Groups	40.654	190	.214		
	Total	43.937	193			
Own land size	Between Groups	2.293	3	.764	4.204	.007
	Within Groups	19.638	108	.182		
	Total	21.931	111			
Size of land suitable for rice growing	Between Groups	7.658	3	2.553	2.014	.113
	Within Groups	252.212	199	1.267		
	Total	259.870	202			

The Gini coefficients of the size of land that is owned by the households and the total size of land controlled or managed by the household for the communities confirm that control of land resources within the communities is characterised by inequitable distribution, particularly in terms of land ownership and the control of rice growing land (Table 9.22).

Table 9.22. Gini coefficients for equality in the distribution of area of land owned and managed in the participating communities

	Own land	All land	Rice land
Conalum	0.70	0.57	0.76
Puting bato	0.78	0.54	0.77
Rizal II	0.67	0.52	0.76
Tigbao	0.65	0.48	0.61

It appears that land is most equitably distributed in Tigbao, and most inequitably in Poting Bato. It is probable that the landholders with the largest areas of land in the communities live outside the community in large metropolitan areas and hence were not included in the sample. Because these households were not included in the survey it is likely that the Gini coefficients of the size of the land managed by households are underestimates of the distribution of land resources in the communities.

The Gini coefficient for the distribution of all land in the Philippines was 0.57 in the year 2000 (NSCB 2003). The coefficient varies for different types of land and varies between regions. It is generally higher in the Visayas, and generally higher for land used to grow coconuts and other fruit crops than for rice land. This is not the case in the communities surveyed, where the coefficient is highest for land owned by the household as opposed to land which is leased or simply managed, and higher for rice land than for land suited to growing other crops.

On average the households that were surveyed own approximately 40% of the land they farm, as illustrated in Table 9.23. Using ANOVA, differences were identified between the communities in terms of the proportion of farming land owned by the responding households (d.f. = 3, F = 6.647, $p<0.0001$), with those in Poting Bato owning considerably less of the land they farm than those in the other communities surveyed (Bonferroni test for multiple differences in the means, $p<0.02$).

Table 9.23: Proportion of total farming land managed that is owned by the household in the participating communities

	n	Mean (%)	Std. Deviation	Mean centred coefficient of variance (%)
Conalum	51	47	.4195	89
Poting Bato	51	21	.3745	178
Rizal II	50	48	.4659	97
Tigbao	49	57	.4194	74
All respondents	201	42.6	.4403	103

The land ownership patterns described above are reflected in the proportion of the respondents from the various communities that are actively cropping some land and the types of cropping they undertake. The proportions of households with access to various types of farming land in the participating communities are illustrated in Table 9.24. There are too many cells in Table 9.24 to allow for a valid chi squared test for association to be undertaken. If the ‘Rice only’ and the ‘Rice plus coconuts and/or vegetables’ categories of Table 9.24 are combined, the proportions of the respondents from each community in various cropping classes are as shown in Table 9.25. There are significant differences between the types of cropping activities undertaken in the communities (d.f. =12 , chi square statistic = 59.388, p = 0.000, Table 9.25).

Table 9.24. Types of cropping activities undertaken by households in the participating communities

Cropping types	Conalum (%)	Poting Bato (%)	Rizal II (%)	Tigbao (%)	Average (%)
Rice plus coconuts and/or vegetables	40	27	24	74	42
Coconuts and vegetables	21	20	27	8	19
Coconuts only	25	6	27	2	15
Vegetables only	10	24	8	4	11
Rice only	4	8	12	8	8
None	0	16	2	4	5
Total	100	100	100	100	100

Table 9.25. Proportion of respondents of various communities undertaking various types of cropping

Community	None	Coconuts only	Coconuts and vegetables	Rice and coconuts and or vegetables	Vegetables only
Conalum (%)	0	25	21	44	10
Poting Bato (%)	16	6	20	35	24
Rizal II (%)	2	27	27	37	8
Tigbao (%)	4	2	8	82	4
Average (%)	5	15	19	50	11

From the responses to the survey it appears that at least half of the households have at least some access to some rice growing land, with households in Tigbao more likely to have rice-growing land than those in other communities, particularly Poting Bato. Respondents from Poting Bato are more likely to have no cropping land at all than those from other communities. The households in Conalum and Rizal II are more likely to have only coconuts as a crop, while in Poting Bato nearly one quarter of respondents have only vegetable crops.

The differences in the area of land owned and rented by households in the various communities are also reflected in the differences between them in terms of the number of farm land parcels used by the household (Table 9.26). The ANOVA test for differences in the number of farm plots operated per household between the communities was significant (d.f.= 3, F = 17.308, p = 0.000). Multiple comparison of means tests for the source of the differences reveal that the respondents from Tigbao and Conalum are likely to control a greater number of farm land parcels than those from Poting Bato and Rizal II, and that Tigbao households have a greater number of farming parcels per household than any of the other communities (Table 9.26).

Table 9.26. Mean number of farming plots used per household in the participating communities

Community	N	Mean	Std. Deviation	Mean centred coefficient of variance (%)
Conalum	52	2.10	0.995	47
Poting Bato	51	1.51	0.834	55
Rizal II	50	1.40	0.639	46
Tigbao	50	2.54	1.092	43
Average	203	1.89	1.011	53

In most cases the household residences are not situated in the fields but rather are located in small communities. The average distance from the households to all of their farming parcels is 3.24 km, an average of 1.68 km to each parcel (Table 9.27).

Table 9.27. Mean total and average distances to farm plots in the participating communities

Variable	Community	N	Mean (km)	Std. Deviation (km)	Median (km)	Mean centred coefficient of variance (%)
Total distance to farm plots (km)	Conalum	52	2.81	2.529	3.0	90
	Poting Bato	51	1.16	1.636	1.0	141
	Rizal II	50	4.00	4.717	2.1	118
	Tigbao	50	5.03	9.138	2.6	182
	All respondents	203	3.24	5.477	2.0	169
Average distance to farm plots (km)	Conalum	52	1.32	1.204	1.1	91
	Poting Bato	45	0.70	0.848	0.5	121
	Rizal II	49	2.66	2.855	2.0	107
	Tigbao	50	1.99	3.938	1.0	198
	All respondents	196	1.68	2.639	1.0	157

Tests revealed differences between the communities in terms of the mean distance from households to their farm plots (Table 9.28). Those in Poting Bato have the least distance to travel, possibly due to a lack of available land, while those in Rizal II have to travel the furthest on average to their plots. The large total distance travelled by Tigbao households to their plots reflects that they have access to greater numbers of farm parcels and greater areas, as they do not have the highest mean average distance to each farm plot as well.

Table 9.28. Results of ANOVA tests for differences in distance from houses to farm plot between the participating communities

Variable	Sum of Squares	df	Mean Square	F	Sig.
Total distance to farm plots	8.416	3	2.805	12.996	0.000
Average distance to farm plots	7.455	3	2.485	13.924	0.000

On average, one half of the households surveyed manage some land suitable for rice growing (Table 9.25), but there are significant differences between the communities (d.f. = 3, Pearsons chi square = 29.155, $p = 0.000$, Table 9.29). Households in Tigbao have greater access to rice growing land than those from other communities ($p < 0.05$). Households in Poting Bato and Rizal II have the least access.

Table 9.29: Proportion of households that have some rice growing land in the participating communities

Community	If have some rice growing land? No (%)	Yes (%)	Total(%)
Conalum	54	46	100
Poting bato	65	35	100
Rizal II	64	36	100
Tigbao	18	82	100
Average	50	50	100

9.6 USE OF MATERIALS FROM PUBLIC LANDS

Lands in the Philippines are classified by the national government according to their slope and present tenure (see Chapter 2). One class is 'Forestland', that is owned and controlled by the government. It is illegal to farm or gather materials from these lands, yet many rural Filipinos have used these resources in the past and some continue to do so. These were no significant differences between communities in terms of the proportion of households that report they are presently using resources from public lands (Table 9.30).

Table 9.30. Whether households use materials from public land in the participating communities

Community	If household presently uses materials from public lands Yes (%)	No (%)	Total (%)
Conalum (%)	24	76	100
Poting Bato (%)	22	78	100
Rizal II (%)	28	72	100
Tigbao (%)	36	64	100
All respondents (%)	28	72	100

Approximately 15% of those who reported they are still using resources from public lands (or less than 5% of the total sample) also reported selling some of these materials. The most common products gathered from public lands are timber products for household construction purposes (Table 9.31).

Table 9.31. Types of products gathered by households from public lands

Product	Frequency of gathering
Timber for poles and posts	35
Lumber	29
Other	9
Firewood or fuel	7

Note: The 'other' category includes bamboo slats, meat, orchids, tagak, and furniture. Respondents could mention more than one product each.

While the difference between communities in terms of their use of public land resources in the past is not significant at the 0.05 level (p = 0.130), some differences between the past and present use of public resources can be noted by comparing Tables 9.30 and 9.32.

Table 9.32. Whether household used public land resources in past in the participating communities

Community	If household used materials from public lands in the past Yes (%)	No (%)	Total (%)
Conalum (%)	31	69	100
Poting Bato (%)	31	69	100
Rizal II (%)	43	57	100
Tigbao (%)	50	50	100
All respondents (%)	38	62	100

Little has changed in Conalum and Poting Bato where less than half the households formerly used public land resources. Greater change has occurred in Tigbao, where half the households used public land resources in the past and now just over one third continue to do so. ANOVA tests revealed significant differences between the communities in terms of the mean number of years since the household stopped using public land resources (d.f. = 3, F = 4.911, p = 0.005, Table 9.33).

Table 9.33. Years since stopped using public lands by community

	N	Mean (years)	Std. Deviation	Mean centred coefficient of variance (%)
Conalum	15	9.6	6.08	63
Poting Bato	6	18.3	8.59	47
Rizal II	12	9.7	5.50	57
Tigbao	21	18.1	10.33	57
Average	54	13.9	9.05	65

The source of the difference is primarily between households in Conalum and Rizal II, and households in Tigbao, with Tigbao residents having stopped using public land resources significantly longer ago than those from Conalum and Rizal II (Bonferroni test for multiple differences in the means, $p < 0.05$).

Various reasons were given for ceasing to use public land resources as illustrated in Table 13.34. The most frequent response from all communities was the lack of remaining resources, followed by the legal status of the resource, the fact that they have completed their house construction, or that they are too old or ill to continue the difficult task of accessing increasingly remote public land resources.

Table 9.34. Frequency of reasons for stopping use of public land resources by community

Community	No resources left	Illegal	House completed	Too old or ill	Other	Total
Conalum	1	6	4	1	3	15
Poting Bato	9	0	0	1	1	11
Rizal II	1	8	0	5	1	15
Tigbao	6	1	9	4	4	24
Total	17	15	13	11	9	65

Note: The 'other' reasons include those too busy, some encounters with rebel groups, concern about the potential for repeating the disaster of Ormoc in 1992, the death of the husband, and the recognition of kaingineros rights to use the land.

The reasons for the cessation of using public land resources appear to differ between communities although there are too few cases to legitimately test this statistically. Nearly all the respondents from Poting Bato and a number from Tigbao who had used public land resources reported they stopped doing so because the resources were severely depleted or non-existent. Those in Rizal II and Conalum, who stopped using the resources later, appear to have been influenced by the changed legal status of the resources.

9.7 TRAINING UNDERTAKEN BY HOUSEHOLD MEMBERS

Many of the people in the communities have attended one or more training activities. On average at least one member from approximately half of the responding households have attended training activities, including a slightly greater proportion of households from Poting Bato and Tigbao than the other communities (Table 9.35). Tests for multiple differences in the means revealed that the proportion of households who had undertaken community forestry and cooperative leadership training differs between the communities. A greater proportion of

Tigbao and Poting Bato residents have attended community forestry training than Conalum residents (Bonferroni test for multiple differences in the means, $p < 0.05$), and greater number Tigbao residents having done cooperative leadership training than those in other communities (Bonferroni test for multiple differences in the means, $p = 0.05$).

Table 9.35. Proportion of households that have attended various types of training by communities

Community	Have attended training	Agriculture training	Community forestry	Community leadership	Cooperative leadership
Conalum (%)	44	23	15	23	0
Poting Bato (%)	61	20	45	18	0
Rizal II (%)	44	20	34	8	2
Tigbao (%)	60	34	36	26	10
Average (%)	52	24	33	19	3

Note: Multiple responses were allowed and thus the total percentage figures are greater than 100 %.

9.8 DEVELOPMENT ATTITUDES AND PRIORITIES FOR DEDVELOPMENT

The survey included a number of questions relating to the households perception of the development needs of their community. Respondents were asked to state in their own words the primary ecological problems confronting their community. They were then asked to state in their own word the primary development needs of the community. The responses to these open-ended questions were examined and were classified for descriptive and analytical purposes (Tables 9.36 to 9.38).

Table 9.36. Proportion of classified responses to open questions about ecological problems of the community by community

	Community				
	Conalum (%)	Poting Bato (%)	Rizal II (%)	Tigbao (%)	Average (%)
Reforestation needed	22	28	5	39	23
Flooding	65	0	9	7	22
Illegal logging	6	9	47	16	18
Soil degradation or loss	0	19	14	16	12
Degradation of the natural forest	2	15	9	11	9
None	6	11	9	7	8
Loss of available water due to clearing	0	11	7	2	5
Kaingin	0	9	0	2	3
	100	100	100	100	100

Finally, respondents were asked to choose their five most preferred development projects from a list of nine. These choices were converted into ratings, with scores assigned to each persons rankings ranging from five for their first choice down to one for their last choice. Those projects that were not in the first five choices of respondents received a score of zero for that person (Figure 9.1). Although the data presented in Table 9.36 are too sparse to be used for a chi square test (because more than 25% of the cells in the analysis table have an expected frequency of less than five), the classification illustrates some of the main concerns and their differences between communities. The respondents from Rizal II were most concerned with the supply of potable water, the transportation difficulties in Tigbao are obvious, and respondents from Poting Bato rate the problems of community cooperation, roads and the need for livelihood approximately equally.

Although the barangay of Conalum is located beside the coast and now on a concrete highway, there is still concern about the road system that services the inland area. Livelihood programs are similarly popular in all communities except Tigbao where they are mentioned on fewer occasions. The assignment of ratings of various potential development projects to the selections by the respondents resulted in the highest scores for health services and transport infrastructure development across all respondents (Figure 9.1).

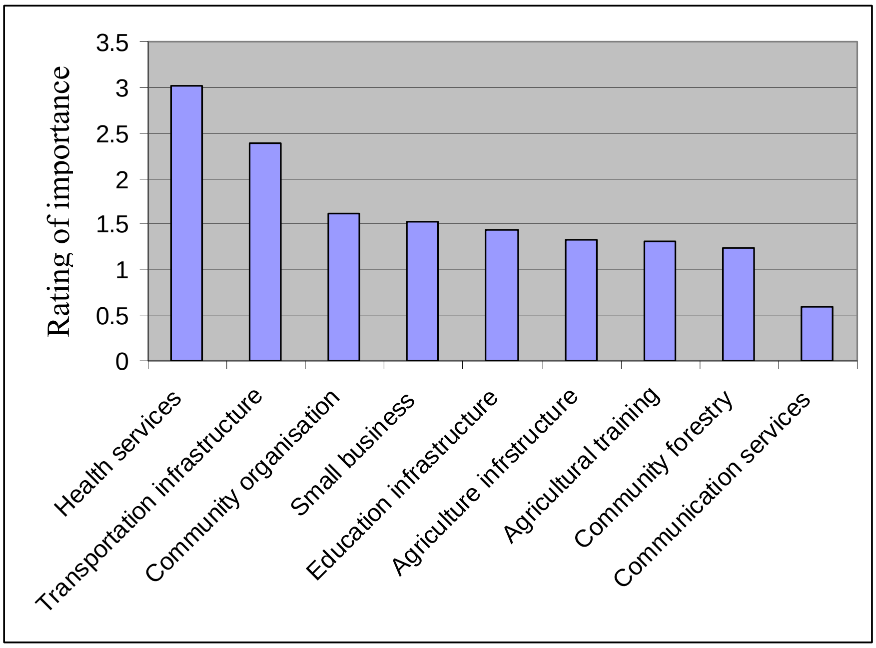

Figure 9.1. Average ratings of importance for various potential forms of community development projects

Note: Respondents were asked to rank their five preferred types of development programs. Scores were allocated from five for the first preference to one for the fifth preference

Table 9.37. Proportion of classified responses to open questions about the community development needs in the participating communities

	Conalum (%)	Poting Bato (%)	Rizal II (%)	Tigbao (%)	Average (%)
Road development	33	22	4	55	29
Livelihood programs	21	22	20	10	18
Potable water supply	2	11	35	12	15
Education/ training	10	11	15	2	10
Community cooperation	0	17	2	8	7
Irrigation/ drainage	17	0	9	0	6
Forest protection	4	7	2	8	5
Other	8	9	2	2	5
Health services	4	2	11	2	5
Total	100	100	100	100	100

The high number of mentions of health infrastructure development in the prompted responses (Table 9.38) contrasts with the few mentions in the unprompted responses (Table 9.37). Support for community forestry programs was low, and support for communications development the lowest.

Table 9.38. Ratings of importance for various potential forms of community development projects in the participating communities

Development priority	Conalum	Poting Bato	Rizal II	Tigbao	Average
Health services	3.4	2.7	3.0	3.0	3.0
Transportation infrastructure	2.0	3.2	0.9	3.5	2.4
Community organisations	1.8	1.5	2.1	1.0	1.6
Small business	1.9	1.5	1.5	1.2	1.5
Education infrastructure	1.1	1.2	2.0	1.4	1.4
Agriculture infrastructure	1.4	0.9	1.6	1.4	1.3
Agricultural training	1.5	1.4	1.3	1.0	1.3
Community forestry	1.2	1.5	1.1	1.2	1.2
Communications	0.4	0.6	0.7	0.7	0.6

Note: Respondents were asked to rank their five preferred types of development programs. Scores were allocated ranging from five for the first preference to one for the fifth preference

ANOVA tests and subsequent Bonferroni tests for multiple differences in the means between communities in terms of their rankings for the various types of potential development projects revealed differences in the ratings for transportation infrastructure (Poting bato and Tigbao > Conalum and Rizal II, $p<0.050$) and education infrastructure (Rizal II > Conalum, $p = 0.063$), and also community organisation development (Rizal II > Tigbao, $p = 0.065$) (Table 9.39).

Table 9.39. Results of ANOVA tests for differences between communities in terms of their ratings for various potential development programs

Development activity	Sum of Squares	df	Mean Square	F	Sig.
Transportation infrastructure	204.744	3	68.248	23.517	0.000
Education infrastructure	26.712	3	8.904	3.438	0.018
Community organisation	31.634	3	10.545	3.168	0.025
Community forestry programs	3.922	3	1.307	0.512	0.675
Agricultural training programs	7.758	3	2.586	0.975	0.406
Small business	14.490	3	4.830	1.516	0.212
Agriculture infrastructure	12.483	3	4.161	1.330	0.266
Health services	12.125	3	4.042	1.212	0.307
Communication services	2.668	3	0.889	0.664	0.575

9.9 SIMILARITIES AND DIFFERENCES IN THE SOCIO-DEMOGRAPHIC AND ECONOMIC CHARACTERISTICS OF THE COMMUNITIES

Analyses of the responses to the household interviews indicate that there are substantial differences in the socio-demographic and economic circumstances of households between the various communities as well as substantial variation within communities. The results of the analyses confirm many of the observations made by the participants in the focus group discussions. For example, the observation by participants in the FGDs in Poting Bato that many are living in poverty was borne out by the data relating to household and per capita incomes. Statistical tests proved that households in Poting Bato are poorer than those in the other communities, own less of the land they manage and have less access to land. This is not to say that there are not very poor households in the other communities, but the incidence and depth of poverty are higher in Poting Bato than in the other communities surveyed. There is substantial variation within each of the communities, as evidenced by the relative size of the mean centred coefficients of the mean cash income and farm land area figures for the communities and the Gini coefficients for the same data.

In part the differences in the socioeconomic circumstances of the residents of the various communities can be attributed to the location of the communities, their topography, as well as their proximity to the coast, large towns and major roads. The differences are also attributable to the land ownership patterns in the communities, and the infrastructure for agriculture. It appears that agrarian reforms, community forestry and agricultural development programs can in some way address the difficulties of poverty and isolation in parts of Leyte. For example, although both Tigbao and Poting Bato are located in the mountainous or 'upland' area of Leyte and have low quality unsealed roads servicing their communities, statistical testing indicated that the households in Tigbao are better-off financially and in terms of their level of food self-sufficiency. This is probably due in part to the implementation of an irrigation development program that ensures that a majority of households have access to farming plots that are reliably watered. It is also partly due to the fact that households were able to gain access to land in Tigbao, while in Poting Bato the dominance of a single landholder has restricted households access to land. Whilst the households in Tigbao have the greatest reliance on farming income of all the communities, their income levels are not significantly below those of households in Conalum and Rizal II.

The proportion of land used by households that is owned by the household is lower in Poting Bato than in the other communities, particularly Tigbao. The difference in Poting Bato is that there has been little irrigation development, no agrarian reform program, and no issuance of certificates of stewardship. In Poting Bato some households reported having no farming land at all, and many others have access only to land suitable for vegetable cropping. The lack of capital and poor roads mean that even though the municipal centre of Isabel is reasonably close, and the biggest manufacturing industries in Leyte are located there, the majority of households in Poting Bato do not benefit from the presence of the industries. It was found during the household surveys that those who do have employment in the manufacturing industries are employed on a casual basis. On average they only work 3-4 months of the year, enough time to dissuade them from carrying on farming but not enough to lift their economic circumstances. It is apparent that the community lost its native forest resources earlier than the other communities, as reflected by the time since they last accessed the resources, plus their reasons for loss of access to that resource. The depressed economic situation is also illustrated by the fact that the housing in Poting Bato is constructed from the least permanent materials, the number of people per household is relatively high, and households receive the least in financial remittances from other family members of all the communities. There appears to be tension within the community, as reflected by the number of respondents who named the need for improved community cooperation as the main development priority of the community.

Both Conalum and Rizal II are located on the coastal plain of Leyte and are now accessed by sealed national highways. The existence of the steep mountainous areas adjacent to these communities has provided a number of opportunities. These areas still have some degraded areas of native forest. These areas were probably retained due to the difficulty of working on steep slopes, and have been under the protection of the local peoples' organisations since about 1990. Rizal II households are better off in terms of the gross yearly income than those from Poting Bato, and households in Conalum are not much lower. The higher incomes in Rizal II appear to be related in part to the proximity of Tacloban, the regional capital, just 45 minutes by public transport from the community, which offers employment and marketing opportunities for households. In Conalum, the coastal location allows many households to engage in fishing to supplement their income and livelihood activities. Some households from both communities have also benefited from community forestry programs that have been granted Certificates of Stewardship over public lands. Households in Conalum have access to a greater number of farm land plots than those in Rizal II and Poting Bato communities, although their plot sizes are, compared to those in Tigbao and Rizal II, small.

9.10 SUMMARY

The results presented in this chapter highlight the differences between the communities in terms of their access to resources, the types of development issues facing the communities, and provide an indication of the degree of variation in the socioeconomic position of households within the communities. In summary each of the communities is in a unique position and the households in each face different challenges to support their livelihood, but there is also a great deal of variation within each of the communities. Control of land resources and size of cash incomes vary greatly between households within in each of the communities, as do the education levels and access to non-farm sources of livelihood. Those households which receive remittances from urban areas or overseas or have a small business are better-off financially than the households that are heavily reliant on income from farming activities. Despite the wide variation in the communities, the demographic and economic characteristics of the households of the sample as a whole are similar to those of the population of rural households in Leyte Province, suggesting that the sample is reasonably representative of the population.

Chapter 10

HOUSEHOLD'S TREE MANAGEMENT BEHAVIOUR AND PERCEPTIONS OF REASONS FOR AND CONSTRAINTS TO TREE MANAGEMENT

This chapter examines household tree management behaviour, intentions and attitudes in the communities that participated in the study in Leyte Province, the Philippines. The analyses presented in this chapter are intended to provide a portrait of the current and intended tree management activities and forestry attitudes of rural households in Leyte Province. It is intended that these analyses will provide an insight into the degree of variation in behaviour and perceptions of households both between and within communities.

The first section of this chapter examines the present and intended behaviour of households in relation to tree planting and management. In the following sections the responses to the questions relating to the importance of various potential reasons for and constraints to tree planting and management are described. Following this, the results of the principal components (factor) analyses, used to create scales and investigate the conceptual linkages between ratings of importance for various potential reasons for and constraints to tree management are described.

10.1 TREE MANAGEMENT BEHAVIOUR ON PRIVATE LAND

A number of variables were computed from the responses to the household interviews to assess households' present and intended tree planting and management behaviour. These variables all relate to the household level of analysis and refer to trees planted and managed on all land managed by the household. The variables measuring the present tree management activities of the households include:

- If presently managing trees (yes or no);
- Total number of trees presently managed;
- Tree planting density (the area of land managed by the household divided by the number of trees managed);
- Trees managed categories (classifies households into four categories based on the number of trees they presently manage);
- If presently managing trees to produce timber (yes or no, includes timber for

household use and for sale); and

- If presently managing trees to produce timber for sale (yes or no).

The variables measuring the intended tree management activities of the households include:

- If intend to plant trees (yes or no);
- Total number of trees intended to plant;
- If intend to plant trees for timber (yes or no);
- Intended number of trees to be sold for timber (yes or no);
- If interested in commercial tree farming (yes or no);
- If intend to plant to produce timber (yes or no, includes timber for household use and for sale).

Most of the respondents reported that they have planted trees or manage on the land they control or else are currently managing tree that have naturally regenerated on site (Table 10.1). The difference between communities is not significant at the 0.05 confidence level (d.f. = 3, chi square = 3.756, p = 0.289).

Table 10.1. Percent of households' who are presently managing trees in participating communities

	Whether presently manage some trees		
Community	Yes	No	Total
Conalum (%)	88	12	100
Poting bato (%)	75	25	100
Rizal II (%)	70	30	100
Tigbao (%)	87	13	100
Average (%)	79	21	100

On average the households in Rizal II grow the most trees for all reasons, and are growing the greatest number of trees for harvest and sale as timber (Table 10.2). There is a high degree of variation within each of the communities in terms of the number of trees being managed as evidenced by the size of the mean centred coefficient of variance for the communities. The classification of the households into of a number of classes according to the number trees they presently manage aids the understanding of this variation and is presented below.

Table 10.2: Tree management activities of households in the participating communities

Tree management measure	Community	N	Mean number of trees	Median	Mean centred coefficient of variance (%)
Total trees managed by the household	Conalum	46	121	23	174.8
	Poting Bato	40	347	12	242.6
	Rizal II	35	708	60	210.8
	Tigbao	43	166	46	209.4
	All respondents	164	313	34	272.6
Number of trees planned to be sold	Conalum	52	5	0	696.0
	Poting Bato	51	0	0	0.0
	Rizal II	50	105	0	501.9
	Tigbao	50	44	0	513.6
	All respondents	203	38	0	752.9
No of trees intended to Harvest for timber	Conalum	52	29	15	208.3
	Poting Bato	51	5	0	398.0
	Rizal II	50	76	0	379.2
	Tigbao	50	54	1	405.0
	All respondents	203	41	0	446.3

Note: transformed data (log 10) was used in the tests for differences between communities while untransformed data is presented in this table.

Testing revealed significant differences between communities in terms of the number of trees planted or managed by the household (Table 10.3), with households in Rizal II managing more trees than those in Conalum (Tahmane post-hoc test for multiple differences, p = 0.011).

Table 10.3: ANOVA tests for differences in the participating communities in total number of tree presently managed by households

Total trees planted or managed	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.518	3	2.506	4.322	0.006
Within Groups	92.778	160	0.580		
Total	100.297	163			

Households were classified into four categories according to the number of trees they reported to be managing (Table 10.4). Tests for differences in the proportions of each community in each category revealed differences in tree number managed per household between the communities (d.f. = 9, chi square = 20.003, p = 0.018).

Table 10.4: Percentage of households from each participating community in various 'total trees planted' categories

Community	None	1 to 20	21 to 100	More than 100	Total
Conalum (%)	12	35	29	25	100
Poting Bato (%)	22	33	22	24	100
Rizal II (%)	30	14	14	42	100
Tigbao (%)	14	18	32	36	100
Average (%)	19	25	24	32	100

The differences between the communities are complex. In Tigbao the proportion of households in each category gradually increases as the number of trees in each category increases from 'none' to 'more than 100'. The proportion of households in various 'number of tree presently managed' categories in Rizal II displays a bi-modal trend, while the mode of Conalum is the '1 – 20 trees' category, and the number of households in each category from Poting Bato is slightly bi-modal, skewed to the lower categories.

10.1.1 Functions of Trees Presently Managed by Households

Respondents were asked in open questions to indicate up to three functions for each species of tree they managed on their land. Categorisation and tabulation of the frequency of each function by communities indicates significant variation between the communities (no chi-squared statistic from tests in Excel, p = 0.000). On average approximately 50% of the trees serve to provide timber for the households' own use and 25 % act as fruit trees (Table 10.5).

Table 10.5: Frequency of use of trees for various functions in the participating communities

	Conalum	Poting Bato	Rizal II	Tigbao	Total
Timber, own use	104	106	64	145	419
Fruit	66	38	55	51	210
Soil protection	35	27	6	7	75
Future generations	10	4	10	25	49
Timber, sale	10	3	21	10	44
Shade for crops	16	0	7	4	27
Copra drying	5	0	0	0	5
Total	246	178	163	242	829

Other functions made up less than 10% of each community's total responses, with the exception of 'soil protection' in the cases of Conalum and Poting Bato, and 'timber for sale' in the case of Rizal II (Table 10.6).

Table 10.6. Percentage of trees reported to fulfil various functions in the participating communities

	Conalum (%)	Poting bato (%)	Rizal II (%)	Tigbao (%)	Average (%)
Timber, own use	44	56	41	61	51
Fruit	29	23	35	22	27
Soil protection	11	17	2	3	8
Timber, sale	3	2	14	4	5
Future generations	4	2	5	8	5
Shade for crops	7	0	3	2	3
Copra drying	2	0	0	0	1
Total	100	100	100	100	100

All of the communities have different patterns of use for their trees. In Tigbao the dominant functions for trees are to provide timber for the household, followed by the lowest use for fruit production of all communities, then the highest rate of bequest for future generations. The respondents from Poting Bato reported a similar emphasis on the provision of timber for the household and fruit production as those from Tigbao; however, they reported the least mentions of bequest functions, and the highest use of trees for soil protection. Respondents from Conalum reported a greater than average use of trees for soil protection, and highest use of trees to provide shade to their other crops, such as Abaca or Spike Pepper, both of which grow best under partial shade. They have relatively low use of trees for household timber, and the only plantings of trees to use in copra-drying ovens by households in all communities. Finally, the respondents from Rizal II reported the greatest use of trees for fruit production and to produce timber for sale.

10.1.2 Intended Tree Management Activities

Seventy five percent of respondents from all communities reported they intended to plant or manage some regenerated trees in the future (Table 10.7). Significant differences were detected in tree management intentions between communities (d.f. = 3, chi-square = 8.835, p = 0.032), with those in Poting Bato less likely to be considering planting more trees than those in other communities (Tables 10.8 and 10.9).

Table 10.7: Number of respondents intending to plant trees

Intend to plant trees	Frequency	If intend to plant trees in the future (Percent)	Valid Percent
Yes	151	74.4	75.5
No	49	24.1	24.5
Total	200	98.5	100.0
Missing data	3	1.5	
Total	203	100.0	

Table 10.8: Percentage of respondents who intend to plant trees in the participating communities

Community	Yes (%)	No (%)	Total
Conalum	83	17	100
Poting bato	60	40	100
Rizal II	80	20	100
Tigbao	80	20	100
All respondents	76	24	100

Only approximately 10% of the respondents indicated they were growing trees to sell some timber or lumber (Table 10.9), with no significant differences found between the communities.

Table 10.9: Whether household is presently growing timber for sale in the participating communities

Community	Yes (%)	No (%)	Total (%)
Conalum	10	90	100
Poting Bato	4	96	100
Rizal II	14	86	100
Tigbao	12	88	100
All respondents	10	90	100

Significant differences were found between communities in terms of whether the respondents indicated they would grow trees for timber in the future (d.f. = 3, chi square = 8.845, p = 0.031, Table 10.10). A greater proportion of respondents from Conalum and Rizal II intend to plant for timber than in Poting Bato and Tigbao. This measure includes those trees planted to provide timber for the households' own use as well as those grown for sale.

Table 10.10. If intend to plant for timber in the participating communities

Community	Yes (%)	No (%)	Total (%)
Conalum	35	65	100
Poting bato	12	88	100
Rizal II	32	68	100
Tigbao	22	78	100
Average	25	75	100

One-way ANOVA tests revealed there are no differences between the communities in terms of the number of trees that households plan to establish, and there are no differences between the in terms of the number of trees intended to be planted for and sold for timber between the communities (Table 10.11).

Table 10.11. Total number of trees intended to plant per household in the participating communities

Intended behaviour	Community	N	Mean number of trees	Median number of trees	Mean centred coefficient of variance (%)
Total number of trees intended to plant	Conalum	52	79.3	20	177.2
	Puting bato	51	169.8	0	419.0
	Rizal II	50	242.6	0	258.6
	Tigbao	50	246.6	1	318.9
	All respondents	203	183.4	1	336.2
No of trees intended to harvest for all timber	Conalum	52	67.2	15	183.8
	Puting bato	51	157.4	0	451.2
	Rizal II	50	213.5	0	290.4
	Tigbao	50	204.0	1	307.2
	All respondents	203	159.6	0	354.8
No of trees intended to harvest for timber for Sale	Conalum	52	38.8	0	191.2
	Puting bato	51	2.3	0	350.7
	Rizal II	50	118.8	0	338.2
	Tigbao	50	72.1	0	485.2
	All respondents	203	57.5	0	466.7

The sizes of the mean centred coefficient of variance figures indicate there is substantial variation between households within communities in regards to their tree planting and management intentions. Although 75% of households stated that they intend to establish trees on their land in the future, many of them did not provide details about their intentions, as indicated by the median values for the various communities in Table 10.11.

10.1.3 Tree Registration Behaviour of Households

The majority of provinces in the Philippines are subject to a logging ban for native forests, with the entire area of Leyte Island covered by this ban. To help enforce the logging ban while at the same time allowing landholders to harvest timber they have planted on their own land, the government through the DENR uses a system of tree registration, i.e. registering of individual planted trees. Respondents were asked to indicate if they had registered their trees, if they knew how to register trees, and if they have not registered them, why not. Only four respondents, approximately 2%, reported that they had registered all or some of their planted trees, while 33 respondents (16%) indicated they knew how to register trees. Respondents were asked to indicate why they had not registered their trees if they knew how to do so. The most common response was that the trees would be registered when harvest began (Table 10.12). Others stated they had no trees to register, or that there were too few trees to bother. Two respondents, from different communities, reported that they had heard the DENR would confiscate the trees if they were registered (Table 10.12).

Table 10.12: Frequency of various reasons for not registering trees despite knowing how to do so

Reason for not registering	Frequency
Not mature for harvest	6
No trees	4
Few trees	4
Too busy	2
Wary of DENR taking trees	2
Because they own the land	1
Too far from CENRO	1
Unmanaged	1
Don't own the trees	1
Community Organisation decision	1
Financial constraints	1
No land title	1

10.1.4 Sources of Seedlings and Advice about Tree Planting and Management

Respondents were asked to indicate the source of the seedlings used to plant on their land; responses are reported in Table 10.13. The majority of respondents indicated that they collected their own seeds and wildlings to be used for planting on their land. Other sources of planting materials included commercial nurseries, the DENR, commercial nurseries and ‘other’ sources, mainly family and friends.

Table 10.13. Sources of seedlings used in the participating communities

Community	Community nursery	DENR	Own collection of seeds and wildlings	Other nursery	Other	Total
Conalum (%)	4.2	8.3	58.3	12.5	16.7	100
Puting bato (%)	4.8	19.0	52.4	14.3	9.5	100
Rizal II (%)	4.1	18.4	55.1	8.2	14.3	100
Tigbao (%)	0	6.1	72.7	9.1	12.1	100
Average (%)	3.3	13.0	59.6	11.0	13.2	

Respondents were asked to indicate if they had sought and received advice about tree planting and management. Only 24% reported they had sought and received advice, the majority from government agencies or friends and neighbours, other sources being community organisations and NGOs (Table 10.14). Some respondents mentioned that they relied on their own experiences as ex-employees of large plantation companies, and they provided a source of advice for their friends and neighbours.

Table 10.14. Source of advice about planting recoded

Source of advice about tree management	Frequency	Percent of households using the source (%)
Government agencies	20	9.8
Friends and neighbours	12	5.9
Community organisation	7	3.4
Non-government agencies	5	2.5
Own experience	4	2.0
Total	48	23.5
Missing data	156	76.5
Total	204	100.0

No differences in seedling sources or sources of advice were found between the various communities using the chi-square test for independence.

10.2 AVERAGE RATINGS OF IMPORTANCE FOR VARIOUS REASONS FOR PLANTING AND MANAGING TREES ON PRIVATE LANDS

To assist in understanding the importance of the relationships between attitudes to tree planting and management, and observed tree planting and management behaviour, respondents involved in the household interviews were asked to indicate the importance of various reasons for and constraints to tree planting and management on a five-point Likert scale from ‘not important’ through to ‘very important’. The lists of 12 reasons and 15 constraints were based on the reasons for and constraints to tree planting and management generated during the focus group discussions in the communities to ensure that the lists were comprehensive, culturally appropriate and locally relevant.

The collection of data relating to tree planting and management attitudes serves a number of purposes. The first is to enable testing of the relationships between tree planting and management attitudes and behaviour using univariate and multivariate analyses (reported in Chapters 12 to 14). A second related purpose is to use the responses to attitudinal questions as a basis for forming clusters of households with similar attitudes to tree planting and management (reported in Chapter 15).

Respondents were asked to rate the importance of 12 potential reasons for planting and managing trees on their land. On average, the highest rated reason is ‘to provide construction materials’ (Table 10.15).

Table 10.15: Mean ratings of importance for various potential reasons for tree planting and management

Potential reason for managing trees	Mean score	Standard Deviation	Number of observations
To provide construction materials	4.69	0.73	199
To benefit future generations	4.66	0.87	199
To protect the soil and prevent landslides	4.66	0.73	199
To improve water quality	4.45	0.95	199
To improve soil fertility	4.42	1.02	199
To improve the water supply volume	4.40	1.02	199
To improve the natural forest quality	4.38	0.95	199
To produce timber/lumber for sale	4.06	1.42	199
Because of a personal interest in trees	4.04	1.35	199
To provide firewood	3.92	1.43	199
To provide shade of crops	3.57	1.55	199
To provide material for charcoal making	2.81	1.78	199

Note: Respondents were asked to indicate the ‘importance’ of various reasons for managing trees on a five point Likert scale. Scores were allocated to the responses ranging from ‘1’ for ‘not important’ to a score of ‘5’ for ‘very important’.

The ratings of importance for a number of variables with similar scores that relate to the protection of the natural environment and the productivity of agricultural areas closely follow those for ‘provision of construction materials’. Commercial and utilitarian reasons for planting and managing trees including firewood and charcoal production are rated lowest on average (Table 10.16). Only one reason was found to differ significantly between communities, “To benefit future generations” (one-way ANOVA test, d.f. = 3, F = 2.793, p = 0.042). Subsequent tests for the source of the differences using the Tamhane method of multiple comparisons of means revealed that no individual differences were significant at the 10% level.

10.3 AVERAGE RATINGS OF IMPORTANCE FOR VARIOUS POTENTIAL CONSTRAINTS TO MANAGING TREES

A set of 15 potential constraints to tree planting and management were presented to respondents during the community household interviews. A Likert scale was used, with scores again allocated to the responses ranging from 1 for ‘not important’ to a score of 5 for ‘very important’. On average respondents rated the lack of land and finance as the greatest constraints, followed by concern about security of tenure and the availability of seedlings (Table 10.16).

Table 10.16. Average ratings of importance for various potential constraints to tree management

Item	Mean score	Standard deviation
Lack of land for planting trees	3.50	1.78
Finances to pay for tree growing needs	3.40	1.73
Concern about security of tenure	3.04	1.84
Availability of seedlings	2.97	1.81
Policies relating to tree harvesting	2.80	1.79
Lack of labour to tend trees	2.70	1.67
Risk of additional fees	2.50	1.66
Knowledge about tree planting and management	2.42	1.67
Time taken for trees to mature	2.38	1.62
Difficulties marketing wood products	2.34	1.65
Competition between trees and crops	2.33	1.62
Potential damage to trees from typhoons	2.20	1.64
Risks from grazing animals	2.15	1.60
Lack access to community organisations	2.13	1.60
Risk of fire damage	2.07	1.61

Note: Respondents were asked to indicate the ‘importance’ of various constraints to managing trees on a five point Likert scale. Scores were allocated to the responses ranging from ‘1’ for ‘not important’ to a score of ‘5’ for ‘very important’.

Tests for differences between communities in terms of their ratings of importance for various potential constraints to tree planting and management revealed that significant differences for all items except ‘finances’ and ‘labour’ requirements (Table 10.17).

Table 10.17. Results of ANOVA tests for differences in ratings of importance for various potential constraints to tree planting and management between the participating communities

Potential constraints to tree planting and management	Sum of Squares	df	Mean Square	F	Sig.
Potential damage to trees from typhoons	50.060	3	16.687	6.783	0.000
Risk of additional fees	57.283	3	19.094	7.587	0.000
Lack access to community organisations	44.447	3	14.816	6.278	0.000
Risks from grazing animals	40.259	3	13.420	5.585	0.001
Lack of land for planting trees	42.344	3	14.115	4.718	0.003
Concern about security of tenure	45.160	3	15.053	4.700	0.003
Time taken for trees to mature	33.789	3	11.263	4.510	0.004
Risk of fire damage	33.829	3	11.276	4.559	0.004
Policies relating to tree harvesting	40.050	3	13.350	4.395	0.005
Competition between trees and crops	30.810	3	10.270	4.106	0.007
Knowledge about tree planting and management	30.275	3	10.092	3.769	0.012
Availability of seedlings	32.657	3	10.886	3.462	0.017
Difficulties marketing wood products	23.369	3	7.790	2.961	0.033
Finances to pay for tree growing needs	4.944	3	1.648	0.544	0.653
Lack of labour to tend trees	3.264	3	1.088	0.387	0.763

In general the households from Poting Bato rated all of the constraints as more important than did those from other communities. Due to the large number of significant results the discussion of the source of the differences is taken up in the following section describing the results of factor analysis of these responses.

10.4 FACTOR ANALYSIS OF THE RATINGS OF IMPORTANCE FOR VARIOUS POTENTIAL REASONS FOR MANAGING TREES

It is to be expected that there are correlations both positive and negative between the ratings of importance ascribed to the variables included in the lists of reasons for and constraints to tree planting and management by households both within and between communities. In order to understand the relationships between responses to various potential reasons for and constraints to tree planting and management, principal components analysis, a form of factor analysis, was used. Principal components analysis serves two main functions. The first is to test for the presence of relationships in the responses in the form of ‘factors’ underlying the responses, and the second is to provide a means to be able to reduce the variables used in subsequent statistical tests (Hair et al. 1998). Principal components analysis is a means to analyse sets of variables that are correlated where the relationships take of form of complex patterns. It works by assessing the degree of variation in a set of variables that can be explained by a lesser number of factors. The analyst then assesses the statistical validity and practical utility of the results to determine the appropriate number of factors to use. Statistical validity can be assessed through examination of the correlations between the variables to be included, and examination of the eigenvalues of a matrix of the factors, a measure of the proportion of variation represented by the number of factors (the latent root test of validity) (Hair et al. 1998).

Once the factors have been identified, examination of the factor matrix allows the analyst to assess the practical utility of the factors. The declaration of practical utility is dependent on whether the items that share a high factor loading on a particular factor are also conceptually linked. If the items are conceptually linked there is an opportunity to calculate scales that can, if they show sufficient reliability as scale as measured by Cronbachs Alpha statistic, be used to represent the variables in subsequent analyses (Hair et al. 1998). These analyses include testing for relationships with a household’s present and intended tree management behaviour, and their socioeconomic and demographic characteristics.

Principal components analysis was used to assess the underlying factors for the responses to questions regarding the importance of managing trees for various reasons. Two factors were revealed with eigenvalues greater than 1 (Table 10.18). All the items other than ‘to provide construction materials’ and ‘to provide shade for crops’ had factor loadings of greater than 0.4 which, in combination with the sample size of 199, indicates they have practical significance at a 0.05 significance level for use as a scale, and a power level of 80% (Hair et al. 1998, p.112). The conceptual links for each of the factors were considered next. The factors appear to split the reasons for planting trees on the basis of the time taken for benefits to be realised by the household. The first factor, led by ‘to provide firewood’, relates to benefits that occur over a short time period, while the items with high factor loadings on the second factor relate to benefits that accrue over a long time period.

Table 10.18. Rotated factor matrix for reasons for tree planting and management

Potential reason for managing trees	Component	
	1	2
To provide firewood	**0.822**	-0.022
To provide material for charcoal making	**0.698**	0.089
To improve water quality	**0.669**	0.503
To improve the natural forest quality	**0.592**	0.413
To improve the water supply volume	**0.575**	0.537
Because of a personal interest in trees	**0.564**	0.378
To benefit future generations	0.066	**0.742**
To improve soil fertility	0.187	**0.658**
To produce timber/lumber for sale	0.166	**0.568**
To protect the soil and prevent landslides	0.452	**0.528**
To provide construction materials	0.409	0.411
To provide shade of crops	0.11	0.453

Extraction method used: principal component analysis.
Rotation method applied: Varimax with Kaiser Normalization.
Rotation converged in 3 iterations.

Two scales were next constructed and tested for reliability using the Cronbach Alpha statistic. A scale can be considered reliable if it has a Cronbach Alpha score of greater than 0.7, or 0.6 for exploratory research such as that undertaken for this thesis (Hair *et al*. 1998, p.118). The first scale was termed 'immediate reasons' and the second 'long-term reasons' for planting and management. The items 'to provide construction materials' and 'to provide shade for crops' were not included in either scale because reliability testing (using Crobachs Alpha) showed they did not improve the reliability of the scales. The reliability (Cronbachs Alpha) of the first scale is 0.8323 and that of the second 0.6553. Both scales were thus found to be reliable and were constructed for use in analyses as averages of all the items for each of the scales. The mean scores for the scale 'long-term reasons' was slightly higher than the mean score for the scale 'immediate reasons' (Table 10.19). No significant differences were found in the mean scores for the two factors between communities.

Table 10.19: Mean scale scores for reasons for planting and managing trees

Potential reason for managing trees scale	N	Mean score	Standard deviation
Reason for managing – immediate term	199	4.00	0.909
Reason for managing – long term	199	4.45	0.712

10.5 FACTOR ANALYSIS OF THE RATINGS OF IMPORTANCE FOR VARIOUS POTENTIAL CONSTRAINTS TO MANAGING TREES

Factor analysis of ratings of importance for various reasons for managing trees identified four underlying factors (Table 10.20). The four factors were examined to determine the themes for each and the items in each were tested for reliability as scales. The first factor was termed 'tree protection' and had a Cronbach alpha statistic of 0.82 indicating it is highly reliable. The second scale was termed 'planting support issues' and with a Cronbach alpha of 0.72 is considered reliable as a scale. The third scale was termed 'commercial viability' and was reliable, with a Cronbach alpha score of 0.75, and thus was also accepted. The fourth scale was termed 'tenure and space' and was also found to be reliable with a Cronbach alpha of 0.76. Scales were constructed to represent each of the factors by computing the average of the scores given to the ratings for each of the items of the factors by each respondent.

Table 10.20: Rotated factor matrix for constraints to tree management

Potential constraint to tree management	Factor			
Item	1	2	3	4
Risk of fire damage	**0.770**	0.224	0.109	0.172
Potential damage to trees from typhoons	**0.729**	0.249	0.232	0.116
Risk of additional fees	**0.696**	0.118	0.309	0.176
Lack access to community organisations	**0.625**	0.231	0.122	0.236
Availability of seedlings	0.252	**0.788**	-0.030	0.108
Knowledge about tree planting and management	0.189	**0.718**	0.296	0.077
Finances to pay for tree growing needs	0.059	**0.658**	0.412	-0.118
Risks from grazing animals	0.342	**0.533**	0.006	0.278
Lack of labour to tend trees	-0.075	0.322	**0.732**	0.274
Time taken for trees to mature	0.439	0.092	**0.650**	0.117
Policies relating to tree harvesting	0.402	0.114	**0.613**	0.051
Difficulties marketing wood products	0.450	0.050	**0.567**	0.085
Concern about security of tenure	0.232	0.077	0.102	**0.853**
Lack of land for planting trees	0.143	0.051	0.124	**0.844**
Competition between trees and crops	0.493	0.157	0.182	**0.501**

Notes: The extraction method used was Principal Component Analysis. The rotation method used was the Varimax method with Kaiser Normalization. Rotation converged in 12 iterations.

All of the scales of constraints to tree planting and management have mean scores for all respondents of between 2 and 3 out of five, ranging from 2.23 for 'crop protection issues' to 2.97 for 'tenure and space' (Table 10.21). Differences in mean scores between communities were significant for three of the four scales, namely those other than 'planting support issues'. In all cases, higher ratings were placed on importance by households from Poting Bato than households from other communities.

Table 10.21. Mean scores for scales of constraints to tree planting and management

Scale of constraints to tree planting and management	N	Mean score	Standard deviation	Cronbach alpha
Constraint to managing - tree protection	198	2.23	1.316	0.8212
Constraint to managing - commercial viability	198	2.55	1.265	0.7465
Constraint to managing - planting support issues	199	2.73	1.261	0.7224
Constraint to managing - tenure and space	197	2.97	1.439	0.7611

10.6 CORRELATIONS BETWEEN SCALES OF REASONS FOR AND CONSTRAINTS TO TREE PLANTING AND MANAGEMENT

Tests were undertaken to assess if there were any positive or negative correlations between the various scales relating to various reasons for and constraints to tree planting and management and continuous metric socioeconomic variables. These tests revealed a number of relationships that are described in the following section.

Tests of the correlations between the various scales revealed that the four scales relating to constraints to tree planting and management (‘tree protect’, ‘planting support’, ‘financial viability’ and ‘tenure and space’) are all positively correlated with each other (Table 10.22).

Table 10.22. Correlations between scales of various reasons for and constraints to tree management

Scale	Statistic	Tree protection	Planting support	Financial viability	Tenure and space	Immediate	Long term
Planting support	Pearson	.530	1				
	Sig.	.000	.				
	N	197	199				
Commercial viability	Pearson	.613	.508	1			
	Sig.	.000	.000	.			
	N	196	198	198			
Tenure and space	Pearson	.539	.356	.456	1		
	Sig.	.000	.000	.000	.		
	N	196	198	197	198		
Immediate	Pearson	.272	.048	-.022	.217	1	
	Sig.	.000	.501	.761	.002	.	
	N	197	199	198	198	199	
Long term	Pearson	.204	.050	-.015	.067	.596	1
	Sig.	.004	.480	.834	.348	.000	.
	N	197	199	198	198	199	199

The scales relating to reasons for tree planting and management ('immediate' and 'long term') have fewer significant correlations, with ratings for 'immediate' reasons for tree planting and management positively correlated with ratings for the constraint scales 'tree protection' and 'tenure and space', and with the 'long term' reasons scale. The 'long term' reasons scale is only correlated with ratings of importance on the 'tree protection' and 'immediate' scales.

10.7 RELATIONSHIPS BETWEEN TREE MANAGEMENT ATTITUDES AND BEHAVIOUR

A series of one-way ANOVA and correlation tests were used to assess if there are any relationships between the scales used to measure households' perceptions of the importance of various reasons for and constraints to tree planting and management and variables measuring tree planting and management behaviour and intentions collected in the survey. Results of these tests are described in the following sections.

10.7.1 Relationships between Attitudes and Present Tree Management Behaviour

The scale 'constraints to managing – tenure and space issues' was the only attitudinal variable with significant variation between those who are and are not presently managing trees (Table 10.23). Those who are not presently managing trees rated this scale significantly higher than those who are presently managing trees (Table 10.24).

Table 10.23. ANOVA test for differences in the mean score on the constraint scale of 'tenure and space issues' by households who are and are not presently managing trees

Constraint to managing – tenure and space	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	11.502	1	11.502	5.689	0.018
Within Groups	396.273	196	2.022		
Total	407.776	197			

Table 10.24. Mean score for the scale 'constraint to planting – tenure and space' by households who are and are not presently managing trees

If presently managing trees	N	Mean score	Standard Deviation	Mean centred coefficient of variance (%)
No	39	3.45	1.392	40
Yes	159	2.85	1.429	50
All respondents	198	2.97	1.439	48

One-way ANOVA tests for differences in households' ratings of importance for attitudinal variables between those who are and are not presently growing timber for sale revealed no significant differences.

Tests for correlations between attitudes to tree management and the tree density of household land revealed significant positive relationships between the tree density of the household land and the constraint scales 'tree protection' and 'tenure and space', and the reason scale 'immediate' reasons (Table 10.25). Tree density was computed as the total size of land managed by the household divided by the total number of trees presently managed by the household.

Table 10.25: Significant correlations between various tree management attitude scales and the tree density of the household land

Scale	Pearson Correlation	Sig. (2-tailed)	N
Constraint to managing - tenure and space	0.203	0.011	157
Constraint to managing - tree protection	0.217	0.007	156
Reason for managing - immediate reasons	0.203	0.010	158

Several variables measuring the perceived importance of various reasons for and constraints to tree planting and management are significantly positively correlated with the total number of trees presently managed by households. These include the potential constraints to tree planting and management 'competition between trees and crops' and 'potential damage to trees from typhoons', and the reason 'to improve water quality', implying that these constraints and reasons are more important to those with large numbers of trees.

10.7.2 Relationships between Attitudes and Intended Tree Planting and Management Behaviour

Those households who intend to plant trees in the future and those who do not differed in terms of the rating of importance they place on the scale ‘tenure and space’, the only attitudinal variable that differed significantly between (Tables10.26 and 10.27). Those who do not intend to plant trees rated this scale higher than those who do intend to plant trees in the future.

Table 10.26: Significant ANOVA test for differences between those who intend to establish trees and those who do not in their ratings of importance for scales of reasons for and constraints to tree management

Scale	Sum of Squares	df	Mean Square	F	Sig.
Constraint to managing – tenure and space	13.18503	1	13.185	6.547	0.011

Table 10.27: Mean score for the scale ‘constraint to planting – tenure and space’ by ‘If intend to plant trees’

If intend to plant trees	N	Mean score	Standard Deviation
No	44	3.40	1.363
Yes	151	2.84	1.440
Total	195	2.96	1.439

Testing of the relationship between the number of trees the household intends to establish in the future and tree management attitudes revealed only one significant correlation. Those who intend to plant a greater number of trees gave lower ratings of importance to the scale of potential constraints to tree management activities ‘financial viability’ (Table 10.28).

Table 10.28: Significant correlation between the scale ‘constraint to managing - financial viability issues’ and the number of trees the household intends to establish in the future

Variables:	Pearson Correlation	Sig. (2-tailed)	N
Scale of constraints to tree management - ‘financial viability’ and the Number of trees household intends to manage	-0.202	0.014	146

10.7.3 Relationships between Attitudes and if Intend to Plant to Produce Trees for Timber

Those who reported an intention to establish trees for timber had a significantly lower rating of importance to the constraint scale ‘tenure and space’ issues than those households who do not intend to produce timber from their tree management activities (Tables 10.29 and 10.30).

Table 10.29. ‘If intending to plant for timber’ by scales of tree management attitudes

Scale	Sum of Squares	df	Mean Square	F	Sig.
Constraint to managing - tenure and space	15.189	1	15.189	7.583	0.006

Table 10.30. Mean ratings of importance for scales of reasons for and constraints to tree management by households that intending to plant for timber or not

Scale	Intend to plant for timber	N	Mean score	Standard Deviation
Constraint to managing - tenure and space issues	No	73	3.33	1.404
	Yes	125	2.75	1.422
	All respondents	198	2.97	1.439

10.7.4 Relationships between Attitudes and if Interested in Commercial Timber Production

Those households that expressed an interest in commercial tree farming gave lower ratings of importance to the constraint scales ‘tree protection’, ‘tenure and space’ and the reasons for managing scale ‘immediate reasons’ than those who did not express interest in commercial tree farming (Tables 10.31 and 10.32).

Table 10.31: One way ANOVA tests between various scales for the importance of reasons for and constraints to tree management and if interested in commercial tree faming

Scale	Sum of squares	df	Mean Square	F	Sig.
Constraint to managing - tree protection	8.822	1	8.822	5.179	0.024
Constraint to managing – tenure and space	33.160	1	33.160	17.455	0.000
Reason for managing – immediate	5.796	1	5.796	7.202	0.008

Table 10.32: Mean value of various scales of reasons for and constraints to tree management by if interested in commercial tree faming

Scale	Interested in commercial tree farming	N	Mean score	Standard Deviation
Constraint to managing - tree protection	No	76	2.50	1.411
	Yes	120	2.07	1.234
	All respondents	196	2.23	1.319
Constraint to managing – tenure and space	No	76	3.47	1.370
	Yes	121	2.63	1.384
	All respondents	197	2.96	1.435
Reasons for managing - Immediate	No	76	4.22	0.815
	Yes	122	3.87	0.944
	All respondents	198	4.00	0.911

The constraints to tree management of ‘tree protection’ and ‘tenure and space’ issues and immediate returns to tree management activity are seen as more important by those who do not express interest in commercial tree farming relative to those who are interested.

10.7.5 Relationships between Attitudes and whether Intend to Plant to Harvest Trees for Timber for Sale

Those households who stated they intend to plant trees in the future to produce timber for sale differed from those households who do not share this intention, in terms of their higher ratings of importance for the three scales of potential constraints ‘tree protection’, ‘planting support’ and ‘tenure and space’, and the ‘immediate’ scale of reasons for planting (Tables 10.33 and 10.34).

Table 10.33. One way ANOVA tests for differences in ratings of importance for various scales of reasons for and constraints to tree management between those households who do and do not intend to plant for timber for sale

Scale	Sum of squares	df	Mean Square	F	Sig.
Constraint to managing - tree protection	10.467	1	10.467	6.207	0.014
Constraint to managing - planting support	8.832	1	8.832	5.687	0.018
Constraint to managing - tenure and space	18.064	1	18.064	9.085	0.003
Reason for managing - immediate	4.543	1	4.543	5.626	0.019

Table 10.34. Mean value of various scales of reasons for and constraints to tree management by if household intends to plant for timber for sale

Scale	If household intends to plant timber for sale	N	Mean	Standard Deviation
Constraint to managing - tree protection	No	148	2.36	1.370
	Yes	49	1.83	1.049
	All respondents	197	2.23	1.316
Constraint to managing - Planting support	No	149	2.86	1.325
	Yes	50	2.37	0.972
	All respondents	199	2.73	1.261
Constraint to managing – tenure and space	No	148	3.14	1.396
	Yes	50	2.45	1.452
	All respondents	198	2.97	1.439
Reasons for managing - Immediate	No	149	4.09	0.865
	Yes	50	3.74	0.993
	All respondents	199	4.00	0.909

These differences would appear to indicate that households that do not intend to plant trees to produce timber in the future are more concerned about factors represented by these constraint scales and are more concerned with the provision of immediate benefits to the household than those who do intend plant trees to produce timber.

The number of trees that households intend to plant and sell as timber in the future is negatively correlated with the constraint scale 'planting support issues', indicating that households intending to sell a greater number of trees are less concerned about planting support issues than those intending to sell fewer trees from future plantings (Table 10.35).

Table 10.35. Correlation test between the scale 'constraint to managing – planting support issues' and the intended number of trees to be planted and sold for timber in the future

Correlations between scale 'planting support'	Pearson Correlation	Sig. (2-tailed)	N
Intended number of tree to be sold for timber	-0.717	0.030	9

10.8 PRESENT AND INTENDED TREE PLANTING AND MANAGEMENT ACTIVITIES OF RURAL HOUSEOLDS IN LEYTE PROVINCE

Analysis of the present and intended tree management activities of households reveals that the majority of households are presently managing a small number of trees with the aim of producing sufficient timber for their own use in construction of housing and tool making, or to produce fruit. Approximately 45% of respondents are presently managing less than 20 trees, and approximately 30% are presently managing more than 100 trees.

Principal components analyses of the ratings of importance for various reasons for and constraints to tree management was successful in terms of providing insight into the factors underlying the responses and in terms of supporting the construction of scales using the items that were correlated with these factors.

In general the importance of all the reasons for tree management were rated highly by respondents. The main differences in the ratings of importance for the scales of reasons for tree management are for the 'immediate' scale. Those households that intend to plant trees for timber for any reason and or plant trees for sale, and those households that are interested in commercial tree planting rated the 'immediate' reasons for tree planting and management significantly lower than those who are not interested in tree planting for timber production.

The theoretical constructs explaining the two factors identified as underlying the ratings of importance given various reasons for tree management appear to support the findings of previous research. Reports from previous research have suggested that the level of resources in terms of the size and quality of land managed by the household and their cash income are critical in determining the time period over which they can plan their livelihood activities (Belsky 1984, Aguilar 1986, Angeles-Reyes 1987, Ponce and Bangi 1988). With half the sample households, and half the rural population, below the regional poverty threshold in terms of their cash income, it is understandable that the length of time taken for benefits to be obtained from forestry activity plays a critical role in the decision making of households. Tests between ratings of importance of scales and the socioeconomic characteristics of the households are examined in the following chapter.

These factors relating to the reasons landholders plant and manage trees contrast with those of similar Australian studies. These studies, and those in Europe and New Zealand, have reported that the factors underlying responses about the importance of various reasons for tree planting and management were characterised by the functions that trees could perform in the landscape i.e. commercial (to produce timber for sale or use on-farm), environmental protection (soil and biodiversity protection), and personal reasons (Emtage *et al*. 2001).

Four factors were identified as underlying responses to the importance of various constraints to tree management. These factors were termed 'tree protection', 'planting support', 'commercial viability', and 'tenure and space'. These factors were, on average, rated less important than the scales that represent the importance of various reasons for tree planting and management. Only one scale the constraint scale of 'tenure and space' was rated differently by those who are and are not presently managing trees, those who do and do not intend to plant trees in the future, and those that intend to plant trees to harvest in the future for timber (Table 10.36). The ratings of importance for this scale also differed significantly between those households who intend to plant trees to produce timber for sale and those that do not, with the rating of importance of this scale consistently higher by those who intend to plant trees for any reason.

Table 10.36. Significant relationships between variables measuring tree planting and management behaviour and scales of constraints to tree planting and management

Tree planting and management variables	Tree protection	Planting support	Financial viability	Tenure and space
If presently managing trees				*
If intend to plant trees				*
If intend to plant trees for timber				*
If interested in commercial tree farming	*			*
If intend to plant to produce timber for sale	*	*		*
Tree planting density	+			+
Intended number of tree to be sold for timber		-		
Number of trees intended to plant			-	

Note: '*' indicates a significant relationship was identified between the variables using ANOVA tests. '+' indicates a positive correlation was found between the variables and '-' a negative correlation.

The constraint scale 'tree protection' ratings differed between those that are interested in commercial tree farming and those who are not, and between those that intend to plant for timber production for their own use or for sale. Again the households that are interested in planting trees for timber rated the items included in this scale as less important than those households that do not intend to plant trees to produce timber and those that did not express interest in commercial tree farming. The constraint scale 'planting support' is the only other attitudinal scale that is significantly different between households that vary in their tree planting and management intentions, and then only in terms of whether the households intend to plant trees in the future that will be used to produce timber for sale.

Fewer significant relationships were identified between variables measuring tree planting and management intentions and ratings of importance for the two scales of reasons for tree management. Those who are interested in commercial tree farming and intend to plant trees to produce timber attach less importance to managing trees for 'immediate' reasons, while those who intend to plant higher numbers of trees in the future gave significantly higher ratings of importance to 'long-term' reasons for tree management, as would be expected (Table 10.37).

Table 10.37. Significant relationships between variables measuring tree planting and management behaviour and intentions and scales of reasons for tree planting and management

Tree planting and management variables	Immediate reasons	Long-term reasons
If interested in commercial tree farming	*	
Number of trees intended to plant		+
If intend to plant to produce timber for sale	*	

Note: '*' indicates a significant relationship was identified between the variables using ANOVA tests. '+' indicates a positive correlation was found between the variables.

Only 10% of respondents reported that they plan to sell any timber from trees they are presently growing. A much greater proportion of respondents (75%) reported that they are interested in commercial tree farming in general terms, although only 25% named the actual species they would grow and the plot on which it may happen. This suggests that households have positive attitudes toward growing trees but are constrained from expanding their tree planting and management activities for a number of reasons. In order to understand the reasons why households are constrained from expanding their tree management activities it is important to examine are the relationships between attitudes to tree management, and the socioeconomic circumstances of the households to see how they are correlated.

It is possible that the lack of variation in ratings for the importance of various reasons is possibly due to the high level of awareness about the potential roles for trees in the landscape. It is difficult to distinguish between people by examining only their ratings of importance of potential reasons for doing something, particularly when all of the reasons are 'good' or important in the right circumstance. The relative lack of relationships between the scales of reasons for tree management contrasts with the number of relationships identified with the scales relating to 'constraints'. It is probable that the households rating of importance for constraint scales will be better able to distinguish between households who have different values and differing socioeconomic needs in regards to tree management.

10.9 SUMMARY

From the analysis of the relationships between attitudes and tree planting and management behaviour and intentions, it can be concluded that a households' perceptions of their tenurial security and the amount of land they have available for farming are the most critical factors affecting their behaviour and intentions. Those households that are have a high level of concern about these factors are not managing any trees at present and do not intend to establish trees on land they manage in the future. If household members are not overly concerned about tenure and a lack of land for planting trees as issues, the decision of households to establish trees for timber production appears to hinge on their perception of the risks facing their potential tree crop from natural calamities, and anthropogenic risks additional fees which may erode the profitability of tree growing activities. Those households that intend to plant trees in the future to produce timber for sale are less concerned about the need for support in the form of seedlings and technical support to aid their tree management activities.

The lack of significant differences in the rating of importance given to the constraint scale 'financial viability' between households with differing tree management practices and intentions suggests that households are in general agreement that commercial tree farming is a potentially profitable activity. The lack of variation on this factor appears to emphasise the importance of the resources required to establish and maintain trees and the time taken to produce financial returns from trees. Before this assertion can be validated, however, it is necessary to examine the relationships between the scales of various reasons for and constraints to tree management and the socioeconomic characteristics of households. These relationships are examined in the following chapter.

Chapter 11

RELATIONSHIPS BETWEEN HOUSEHOLD'S ATTIUDES TO TREE MANAGEMENT AND THEIR SOCIOECONOMIC CHARACTERISTICS

This chapter extends the analysis of the survey of community attitudes to forestry by investigating whether there are significant differences between the communities in terms of their attitudes to tree planting and managements. The various scales identified in Chapter 11 are used in this analysis. In addition, the proposition that relationships exist between a household's tree management attitudes and their socioeconomic characteristics is assessed. To test this proposition, a series of one-way ANOVA and correlation tests are used to evaluate the relationships between the ratings of importance given to various scales of reasons for and constraints to tree management and socioeconomic variables. In this chapter these tests are reported and discussed. The first section describes the results of tests between ratings of importance for the various attitude scales and categorical socioeconomic variables, while the second section describes the results of tests for relationships between the scales identified in Chapter 11 and continuous socioeconomic variables. In the final section the results of all the tests are discussed and the implications for the thesis considered.

11. 1 TESTS BETWEEN HOUSEHOLDS ATTITUDES TO TREE PLANTING AND MANAGEMENT AND CATEGORICAL SOCIOECONOMIC VARIABLES

One-way ANOVA tests were used to test for differences between in the ratings of importance for various scales of potential reasons for and constraints to tree planting and management and categorical socio-economic variables (see Chapter 5 for details about the hypotheses used for these and other tests).

11.1.1 Differences in Attitudes to Tree Planting and Management between Communities

The households in the various communities included in the survey gave significantly different ratings of importance for the scales of potential constraints to tree planting and management 'tree protection', 'financial viability' and 'tenure and space' issues (Tables 11.1 and 11.2). No significant differences were found between communities in terms of their ratings for the scales of reasons for tree planting and management.

Table 11.1: One-way ANOVA tests between various scales for the importance of reasons for and constraints to tree management and communities

Scale	df	Mean Square	F	Sig.
Constraint to planting - tree protection	3	14.562	9.507	.000
Constraint to planting - financial viability issues	3	6.815	4.485	.005
Constraint to planting – tenure and space	3	12.706	6.668	.000

Table 11.2: Mean value of various scales of reasons for and constraints to tree management in the participating communities

Scale	Community	N	Mean score	Standard deviation
Constraint to planting - tree protection	Conalum	51	1.79	1.148
	Puting bato	51	2.83	1.299
	Rizal II	48	2.54	1.375
	Tigbao	47	1.74	1.109
	Total	197	2.23	1.316
Constraint to planting - financial viability issues	Conalum	51	2.43	1.228
	Puting bato	51	3.05	1.319
	Rizal II	48	2.52	1.264
	Tigbao	48	2.18	1.104
	Total	198	2.55	1.265
Constraint to planting - tenure and space	Conalum	51	2.79	1.433
	Puting bato	51	3.70	1.260
	Rizal II	48	2.76	1.409
	Tigbao	48	2.58	1.417
	Total	198	2.97	1.439

In terms of ratings of importance for ‘tree protection issues’ as a constraint to tree planting and management, households in Puting Bato and Rizal II gave higher ratings of than households in Tigbao and Conalum (Tahmane multiple comparison of means tests $p<0.05$). In terms of ratings of importance for ‘financial viability issues’ as a constraint to tree planting and management, households in Putting Bato, gave significantly higher ratings of importance than households in Tigbao (Bonferroni multiple comparison of means tests, $p<0.05$). In terms of ratings of importance for ‘tenure and space issues’ as a constraint to tree planting and management, households in Puting Bato gave significantly higher ratings of importance than those in the other communities (Bonferroni multiple comparison of means tests, $p<0.05$).

11.1.2 Differences in Attitudes to Tree Planting and Management between Households that Produce Various Proportions of their Staple Food Requirements

There were differences between households in their ratings of importance for the two scales of potential reasons for planting 'immediate' and 'long term' between households according to the proportion of their staple food requirements that they produced (Tables 11.3 and 11.4). Households that report they grow 0-25% of their staple food needs (rice and or corn) gave significantly higher ratings of importance to 'immediate' and 'long-term' reasons for planting than those who reported producing 50-75% of their staple food requirements ($p<0.05$ Bonferroni multiple comparison of means tests). No such differences between households were found for their ratings of importance for the scales of constraints to tree planting and management (Table 11.4).

Table 11.3: One way ANOVA tests scales for the importance of reasons for tree management and proportion of staple food grown by the household

Scale	Sum of squares	df	Mean Square	F	Sig.
Reason for planting - immediate	11.20133	3	3.734	4.776	0.003
Reason for planting - long term	4.273338	3	1.424	2.887	0.037

Table 11.4: Mean value of various scales of reasons for and constraints to tree management by proportion of staple food grown by the household

Scale	Proportion of staple food grown	N	Mean score	Standard deviation
Reasons for planting - Immediate	0 - 25%	91	4.23	0.883
	26 - 50%	36	4.02	1.013
	51 - 75%	36	3.63	0.766
	76 - 100%	36	3.79	0.857
	All respondents	199	4.00	0.909
Reasons for planting - Long term	0 - 25%	91	4.51	0.807
	26 - 50%	36	4.51	0.625
	51 - 75%	36	4.14	0.667
	76 - 100%	36	4.54	0.487
	All respondents	199	4.45	0.712

11.1.3 Differences in Attitudes to Tree Planting and Management between Households that Produce Various Proportions of their Own Total Food Requirements

Testing of the differences in attitudes to tree planting and management between households that produce differing proportions of their own total food requirements revealed differences in the ratings of importance given to the scales of reasons for tree planting and management, together with differences in terms of their ratings of importance for the scales of constraints to tree planting and management 'financial viability' and 'tenure and space' issues (Tables 11.5 and 11.6).

Table 11.5: One way ANOVA tests between various scales for the importance of reasons for and constraints to tree planting and management and proportion of total food grown by the household

Scale	Sum of squares	df	Mean Square	F	Sig.
Constraint to planting - financial viability issues	19.589	3	6.530	4.284	0.006
Constraint to planting - tenure and space	16.250	3	5.417	2.684	0.048
Reason for planting - immediate	17.034	3	5.678	7.552	0.000
Reason for planting - long term	5.758	3	1.919	3.950	0.009

Table 11.6: Mean value of various scales of reasons for and constraints to tree management by proportion of total food grown by the household

Scale	Proportion of total food needs	N	Mean score	Standard deviation
Constraint to managing - financial viability issues	0 - 25%	100	2.51	1.311
	26 - 50%	43	2.97	1.229
	51 - 75%	37	2.59	1.146
	76 - 100%	18	1.74	0.929
	All respondents	198	2.55	1.265
Constraint to managing - tenure and space	0 - 25%	99	3.16	1.414
	26 - 50%	43	3.10	1.432
	51 - 75%	37	2.61	1.355
	76 - 100%	19	2.35	1.549
	All respondents	198	2.97	1.439
Reasons for managing - Immediate	0 - 25%	100	4.22	0.879
	26 - 50%	43	3.98	0.889
	51 - 75%	37	3.43	0.880
	76 - 100%	19	3.99	0.708
	All respondents	199	4.00	0.909
Reasons for managing - Long term	0 - 25%	100	4.53	0.800
	26 - 50%	43	4.31	0.619
	51 - 75%	37	4.22	0.613
	76 - 100%	19	4.79	0.315
	All respondents	199	4.45	0.712

Households that produce 51-75% of their total food needs gave the lowest ratings of importance for both scales of reasons for planting and managing trees. In general those households that produce the least of their own food requirements rated the constraints to tree planting and management higher than those who produce higher proportions of their food requirements. In terms of the ratings of importance for the scales of reasons for tree planting and management, those households that produce 76-100% of their own food requirements placed significantly higher ratings of importance on ‘long-term’ reasons for planting and management than those in the 51-75% bracket.

Differences in the ratings of importance given to various scales of reasons for and constraints to tree planting and management between households that produce different proportions of their total food requirements are listed below:

- Constraint scale ‘financial viability’; households that produce 26-50% of their total food > households that produce 76-100% of their total food ($p=0.004$) (Bonferroni multiple comparison of means tests)
- Constraint scale ‘tenure and space’; households that produce 0-25% of their total food > households that produce 51-75%, and 76-100% of their total food needs ($p<0.05$) (Least Significant Difference multiple comparison of means tests)
- Reason scale ‘immediate’; households that produce 0-25% and 26-50% of their total food needs > households that produce 51-75% of their total food needs ($p<0.05$) (Bonferroni multiple comparison of means tests)
- Reason scale ‘long term’; households that produce 76-100% of their total food needs > households that produce 51-75% of their total food needs ($p=0.024$) (Bonferroni multiple comparison of means tests)

11.1.4 Differences in Attitudes to Tree Management between Households whose Residence are constructed with Various Types of Materials

Testing of the differences in the ratings of importance for the various scales of reasons for and constraints to tree planting and management between households with various types of housing constructions materials revealed that those households which have housing made of ‘mixed materials’ gave lower ratings of importance for the scale ‘long-term’ reasons for planting than those households that have housing made of concrete ($p=0.026$, Bonferroni) (Tables 11.7 and 11.8).

Table 11.7: One way ANOVA tests between the scale ‘long-term’ reasons for tree management and household construction materials

Scale	Sum of squares	df	Mean Square	F	Sig.
Reason for managing - long term	3.844	2	1.922	3.898	0.022

Table 11.8: Mean values of the scale 'long-term' reasons for tree planting and management by types of household construction materials

Scale	Housing materials	N	Mean score	Standard deviation
Reasons for managing - Long term	Light materials	81	4.50	0.720
	Mixed materials	70	4.27	0.755
	Concrete	48	4.62	0.581
	All respondents	199	4.45	0.712

11.1.5 Differences in Attitudes to Tree Management between Households that have Formal Lease Contracts and Those that Do Not

Testing for differences in the ratings of importance for the various scales of reasons for and constraints to tree planting and management between households with and without formal lease contracts revealed differences in terms of the ratings of importance for the two scales of reasons for planting and managing trees, and no differences in their ratings of importance for the scales of constraints to tree planting and management (Tables 11.9 and 11.10).

Table 11.9: One way ANOVA tests between various scales for the importance of reasons for tree management and if have lease contract

Scale	Sum of squares	df	Mean Square	F	Sig.
Reason for managing - immediate	21.231	1	21.231	31.858	0.000
Reason for managing - long term	5.207	1	5.207	14.615	0.000

Those households with formal lease contracts placed less importance on both scales of reasons for planting and management than those without formal lease contracts.

Table 11.10: Mean value of various scales of reasons for and constraints to tree management by if have lease contract

Scale	Whether have a lease contract	N	Mean score	Standard deviation
Reasons for managing - Immediate	No	111	4.26	0.774
	Yes	55	3.50	0.896
	Total	166	4.01	0.889
Reasons for managing - Long term	No	111	4.61	0.529
	Yes	55	4.23	0.715
	Total	166	4.48	0.621

11.1.6 Differences in Attitudes to Tree Management between Households that Use or Have Used Materials from Public Lands and Those That Do or Have Not

Testing for differences in the ratings of importance for the various scales of reasons for and constraints to tree planting and management between households that reported using materials from public lands and those that do not is reported in Tables 11.11 and 11.12.

Those that reported that they use materials from public lands rated the importance of 'tree protection' issues lower and 'financial viability' higher than those that do not use materials from public land. Those that reported they continue to use materials from public lands rated the importance of both scales of reasons for planting and managing trees lower than those who do not presently use materials from public lands.

Table 11.11: One way ANOVA tests between various scales for the importance of reasons for and constraints to tree management and if use materials from public land

Scale	Sum of squares	df	Mean Square	F	Sig.
Constraint to managing - tree protection	6.691	1	6.691	3.886	0.050
Constraint to managing - financial viability issues	7.065	1	7.065	4.517	0.035
Reason for managing - immediate	31.557	1	31.557	46.485	0.000
Reason for managing - long term	6.484	1	6.484	13.325	0.000

Table 11.12: Mean value of various scales of reasons for and constraints to tree management by if use materials from public land

Scale	Use public land materials	N	Mean score	Standard deviation
Constraint to managing - tree protection	No	139	2.35	1.432
	Yes	54	1.93	0.928
	All respondents	193	2.23	1.322
Constraint to managing - financial viability Issues	No	140	2.42	1.317
	Yes	54	2.85	1.058
	All respondents	194	2.54	1.262
Reasons for managing - Immediate	No	141	4.24	0.818
	Yes	54	3.35	0.840
	All respondents	195	4.00	0.915
Reasons for managing - Long term	No	141	4.56	0.719
	Yes	54	4.15	0.638
	All respondents	195	4.45	0.719

Similar differences between households that presently use materials from public lands and those that do not were obtained from testing the differences between those households that reported using materials from public lands in the past and those that had not. The only differences between the test results are that those households who used materials from public lands in the past rating the importance of the constraint scale 'tenure and space issues' lower than those who have not, and there are no differences in the ratings of importance for the constraint scale 'financial viability' (Tables 11.13 and 11.14).

Table 11.13: One way ANOVA tests between various scales for the importance of reasons for and constraints to tree management and if used materials from public land in the past

Scale	Sum of squares	df	Mean Square	F	Sig.
Constraint to managing - tree protection	11.729	1	11.729	6.846	0.010
Constraint to managing - tenure and space	14.715	1	14.715	7.425	0.007
Reason for managing - immediate	19.618	1	19.618	26.763	0.000
Reason for managing - long term	3.753	1	3.753	7.410	0.007

Table 11.14: Mean value of various scales of reasons for and constraints to tree management by if used materials from public land in the past

Scale	Use public land materials in the past	N	Mean score	Standard deviation
Constraint to managing - tree protection	No	117	2.44	1.406
	Yes	73	1.93	1.134
	All respondents	190	2.25	1.329
Constraint to managing – tenure and space	No	117	3.20	1.421
	Yes	73	2.63	1.386
	All respondents	190	2.98	1.431
Reasons for managing - Immediate	No	118	4.25	0.754
	Yes	73	3.59	1.001
	All respondents	191	4.00	0.912
Reasons for managing - Long term	No	118	4.55	0.691
	Yes	73	4.26	0.744
	All respondents	191	4.44	0.724

11.1.7 Differences in Attitudes to Tree Management between Households that Know How to Register their Trees with DENR and Those that Do Not

Testing for differences in the ratings of importance for the various scales of reasons for and constraints to tree planting and management between households that knew how to register trees and those that do not revealed that those who do not know how to register trees rated the importance of the constraint scale 'tree protection' higher than those households that do know how to register trees (Tables 11.15 and 11.16).

Table 11.15: One way ANOVA tests between the scale of constraints to tree management 'tree protection issues' and if know how to register trees

Scale	Sum of squares	df	Mean Square	F	Sig.
Constraint to managing - tree protection	6.847	1	6.847	3.975	0.048

Table 11.16: Mean scores for the scale of constraints to tree management 'tree protection' for those households that do and do not know how to register trees

	Know how to register trees	N	Mean score	Standard deviation
Constraint to managing - tree protection	No	156	2.31	1.356
	Yes	32	1.80	1.070
	All respondents	188	2.23	1.323

11.1.8 Differences in Attitudes to Tree Management between Households that Have Been or are Members of Community Organisations and those that Have Not

Testing for differences in the ratings of importance for the various scales of reasons for and constraints to tree planting and management between households that have and have not been members of community organisations are reported in Table 11.17. These test revealed that those households that have been members of community organisations gave lower ratings of importance for the constraints scales 'planting support' and 'tenure and space' issues, and lower ratings of importance for 'immediate' reasons for tree planting and management than households who have not belonged to community organisations (Table 11.18).

Table 11.17: One way ANOVA tests between various scales for the importance of reasons for and constraints to tree management and if been a member of a community organisation

Scale	Sum of squares	df	Mean Square	F	Sig.
Constraint to managing - planting support issues	8.674	1	8.674	5.564	0.019
Constraint to managing - tenure and space	24.686	1	24.686	12.703	0.000
Reason for managing - immediate	4.207	1	4.207	5.176	0.024

Table 11.18: Mean value of various scales of reasons for and constraints to tree management by if been a member of a community organisation or not

Scale	If been a member of a community organisation	N	Mean score	Standard Deviation
Constraint to managing - planting support	No	96	2.95	1.303
	Yes	102	2.53	1.195
	All respondents	198	2.74	1.263
Constraint to managing – tenure and space	No	95	3.32	1.357
	Yes	102	2.61	1.427
	All respondents	197	2.96	1.435
Reasons for managing - Immediate	No	96	4.15	0.830
	Yes	102	3.86	0.964
	All respondents	198	4.00	0.911

11.1.9 Differences in Attitudes to Tree Management between Households that Participated in Community Forestry Projects and Those That Have Not

Testing for differences in the ratings of importance for the various scales of reasons for and constraints to tree planting and management between households who have and have not participated in community forestry projects revealed that those households that have participated in community forestry projects gave lower ratings of importance for the scale of constraints to tree planting and management 'tenure and space' than those who have not participated in a community forestry project (Tables 11.19 and 11.20).

Table 11.19: One way ANOVA tests between various scales for the importance of the constraint scale for tree planting and management 'tenure and space' and if participated in a community forestry project

Scale	Sum of squares	df	Mean Square	F	Sig.
Constraint to planting – tenure and space	11.547	1	11.547	5.841	0.017

Table 11.20: Mean value of the scale of constraint to tree management 'tenure and space' by if participated in community forestry project

Scale	If participated in a community forestry project	N	Mean	Standard deviation
Constraint to managing – tenure and space	No	115	3.17	1.432
	Yes	75	2.67	1.366
	All respondents	190	2.97	1.424

11.1.10 Differences in Attitudes to Tree Management between Households that Own Some of their Farming Land and Those That Do Not

Testing for differences in the ratings of importance for the various scales of reasons for and constraints to tree planting and management between households that own some portion of the land they use for farming and those that do not revealed differences in terms of the ratings of importance for all scales of constraints to tree planting and management (Tables 11.21 and 11.22).

Table 11.21: One way ANOVA tests between various constraints to tree management and if have own land

Scale	Sum of squares	df	Mean Square	F	Sig.
Constraint to managing - tree protection	14.250	1	14.250	8.549	0.004
Constraint to managing - planting support issues	12.701	1	12.701	8.283	0.004
Constraint to managing - financial viability issues	10.864	1	10.864	6.996	0.009
Constraint to managing – tenure and space	43.932	1	43.932	23.666	0.000

Those households that do own a portion of the land they use for farming rated all of the scales of constraints to tree management lower than those who do not own any land (Table 11.22).

Table 11.22: Mean value of various scales of constraints to tree planting and management by if have own land

Scale	If have own land	N	Mean score	Standard deviation
Constraint to managing - tree protection	No	86	2.54	1.331
	Yes	111	2.00	1.259
	All respondents	197	2.23	1.316
Constraint to managing - planting support	No	86	3.02	1.253
	Yes	113	2.51	1.227
	All respondents	199	2.73	1.261
Constraint to managing - financial viability issues	No	85	2.82	1.287
	Yes	113	2.35	1.214
	All respondents	198	2.55	1.265
Constraint to managing - tenure and space	No	86	3.50	1.307
	Yes	112	2.55	1.403
	All respondents	198	2.97	1.439

11.1.11 Differences in Attitudes to Tree Management between Households that Own Some Farming Land Suitable for Rice Growing and Those That Do Not

Testing for differences in the ratings of importance for the various scales of reasons for and constraints to tree planting and management between households that do and do not own their own land suitable for growing rice revealed that households which do own a portion of land suitable for rice growing rated the constraints scales ‘financial viability’ and ‘tenure and space’ issues lower than those who do not own their own land suitable for rice growing (Tables 11.23 and 11.24).

Table 11.23: One way ANOVA tests between various scales for the importance of constraints to tree management and if have own rice land

Scale	Sum of squares	df	Mean Square	F	Sig.
Constraint to managing - financial viability	11.146	1	11.146	7.184	0.008
Constraint to managing – tenure and space	12.182	1	12.182	6.036	0.015

Table 11.24: Mean value of various scales of constraints to tree management by if have own rice land

Scale	If have own rice land	N	Mean score	Standard deviation
Constraint to managing - financial viability issues	No	164	2.66	1.265
	Yes	34	2.03	1.144
	All respondents	198	2.55	1.265
Constraint to managing – tenure and space	No	164	3.08	1.457
	Yes	34	2.42	1.224
	All respondents	198	2.97	1.439

11.1.12 Differences in Attitudes to Tree Management between Households that are Above the Official Poverty Line and Those That Are Not

Testing for differences in the ratings of importance for the various scales of reasons for and constraints to tree management between households above and below the official poverty line revealed that those households that are below the poverty line rated ‘immediate’ reasons for tree planting and management higher than households above the poverty line (Tables 11.25 and 11.26).

Table 11.25: One way ANOVA tests between the scale 'immediate' reasons for tree planting and management and if household below the poverty line

	Sum of squares	df	Mean Square	F	Sig.
Reason for managing – immediate	4.002	1	4.002	4.938	0.027

Table 11.26: Mean value of various scales of reasons for and constraints to tree management by if below poverty line or not

Scale	If above or below the poverty line	N	Mean	Standard deviation
Reasons for managing - Immediate	Below poverty line	127	4.11	0.843
	Above poverty line	72	3.81	0.993
	Total	199	4.00	0.909

11.2 TESTS BETWEEN HOUSEHOLDS' ATTITUDES TO TREE PLANTING AND MANAGEMENT AND CONTINUOUS SOCIOECONOMIC VARIABLES

Testing for relationships between the ratings of importance for various scales of potential reasons for and constraints to tree management and continuous socioeconomic variables was undertaken using testing of correlations between the variables. In the following section the results of these tests are described.

11.2.1 Relationships between Various Scales of Potential Constraints to Tree Management and Continuous Socioeconomic Variables

Tests of the correlations between the ratings of importance for the scales of constraints to tree management and continuous variables revealed a number of significant relationships which are discussed in the following section (Tables 11.27 to 11.30). Several variables were related to each of the constraints scales. These include the proportion of farm land owned by the household and the average and total distance to the farm plots of the household from their place of residence which are negatively correlated with each of the scales of constraints to tree planting and management.

Table 11.27: Significant correlations between the scale 'constraint to managing – tree protection issues' and various socioeconomic variables

Variables	Pearson Correlation	Sig. (2-tailed)	N
Proportion of farm land owned	-0.196	0.006	195
Total distance to farm plots	-0.185	0.009	197
Average distance to farm plots	-0.169	0.020	190
Total household cash income	-0.163	0.022	196

The total size of a households' land and size of the land they own is negatively correlated with ratings of importance for the scales 'financial viability' and 'tenure and space' issues, while the size of household land that is of moderate to steep slope is negatively correlated to the scales 'planting support' and 'tenure and space' issues.

Ratings of the importance of tree protection issues as a constraint to tree management were higher for households that have lower levels of gross yearly cash income. Tests of the correlations between the ratings of importance for the scale of constraints to tree management 'planting support' issues and continuous variables revealed significant positive relationships with the variables ratio of working adults to children and the time that the family has lived in the barangay (Table 11.28).

Table 11.28: Significant correlations between the scale 'constraint to managing – planting support issues' and various socioeconomic variables

Variables	Pearson Correlation	Sig. (2-tailed)	N
Proportion of income from farming	0.178	0.012	197
Average distance to farm plots	-0.180	0.012	192
Total distance to farm plots	-0.157	0.026	199
Proportion of farm land owned	-0.174	0.015	197
Ratio of working adults to children	0.207	0.017	134
Time family lived in barangay	0.279	0.019	70
Proportion of household land with moderate to steep slope	-0.165	0.023	189
Size of household land with moderate to steep slope	-0.146	0.039	199

Tests of the correlations between the ratings of importance for the scale of constraints to tree management 'financial viability' issues revealed that the ratings of importance on this scale were negatively related to the number of people in the household, and positively related to the time the family of the household has lived in the barangay (Table 11.29).

Table 11.29: Significant correlations between the scale ‘constraint to managing – financial viability issues’ and various socioeconomic variables

Variables	Pearson Correlation	Sig. (2-tailed)	N
Time family lived in barangay	0.315	0.008	70
Total distance to farm plots	-0.170	0.017	198
Average distance to farm plots	-0.166	0.022	191
Size of all household land	-0.168	0.020	189
Size of owned land	-0.161	0.023	198
Proportion of farm land owned	-0.156	0.029	196
Number of people in the household	-0.142	0.046	198

Tests of the correlations between the ratings of importance for the scale of constraints to tree management ‘tenure and space’ issues is negatively related to the number of farming plots used by the household (Table 11.30).

Table 11.30: Significant correlations between the scale ‘constraint to managing – tenure and space issues’ and various socioeconomic variables

Variables	Pearson Correlation	Sig. (2-tailed)	N
Proportion of farm land owned	-0.288	0.000	196
Size of owned land	-0.229	0.001	198
Size of all household land	-0.200	0.005	198
Size of household land with moderate to steep slope	-0.148	0.037	198
Average distance to farm plots	-0.211	0.003	191
Total distance to farm plots	-0.234	0.001	198
Number of farming plots used	-0.163	0.021	198

11.2.2 Relationships between Various Scales of Potential Reasons for Tree Planting and Management and Continuous Metric Socioeconomic Variables

Tests of the correlations between the ratings of importance for the scale of ‘immediate’ reasons for tree planting and management and continuous socioeconomic variables revealed just two significant relationships (Table 11.31). The amount of money received through remittances and the proportion of land of moderate to steep slope are both negatively related to ratings of importance for ‘immediate’ reasons for managing trees.

Table 11.31: Significant correlations between the scale ‘reasons for managing – immediate’ and various socioeconomic variables

Variables	Pearson Correlation	Sig. (2-tailed)	N
Remittance amount average per year	-0.313	0.000	196
Proportion of household land with moderate to steep slope	-0.159	0.028	190

Only two variables were found to be significantly correlated with ratings of importance to the scale ‘long-term’ reasons for managing trees (Table11.32). The total number of trees the household intends to establish in the future is positively related, while the amount of money received by the household through remittances is negatively correlated to the scale.

Table 11.32: Significant correlations between the scale ‘reasons for managing – long term’ and various socioeconomic variables

Variables	Pearson Correlation	Sig. (2-tailed)	N
Remittance amount average per year	-0.186	0.009	196
Trees intended plant	0.175	0.034	147

11.3 IMPLICATIONS OF RELATIONSHIPS BETWEEN ATTIUDES TO TREE PLANTING AND MANAGEMENT AND SOCIOECONOMIC VARIABLES

The analyses of the relationships between attitudes to tree management and socioeconomic characteristics of households revealed numerous relationships between them. The number of significant relationships between the variables and the interrelationships between them mean that interpreting the results of the bivariate analyses is difficult. Nevertheless, some trends in the relationships indicated by the analyses are apparent.

The socioeconomic variables that measure the land resources available to the households have the greatest number of significant relationships with the attitudes of the households to tree planting and management (Table 11.33). In particular the ownership of some area of land that is used for farming and the proportion of the farm land managed by the household that is owned by them both appear to have relationships with the attitude of the household to all of the potential constraints to tree planting and management. The total size of the land managed by the household also has an effect on the attitude of the household to tree planting and management. Concern about the financial viability of tree planting and the concern about tenure security and lack of land for tree planting decreases as the area of land and the number of farming parcels managed by the household increases.

The financial resources of the household have fewer relationships with their attitudes to tree planting and management, as the only relationship revealed through testing is reduced ratings of importance for the constraint scale 'tree protection' with the increase in a households' cash income. This is possibly due to a lower concern about the risks of loss of timber or financial returns from tree planting by those households which are comparatively well-off. The higher ratings of importance for 'immediate' reasons for planting by households that are below the poverty threshold compared to those above the poverty threshold would support this hypothesis (Table 11.34).

Table 11.33: Significant relationships between scales of constraints to tree management and socioeconomic variables

Socioeconomic variable	**Tree protection**	**Planting support**	**Financial viability**	**Tenure and space**
Communities	*		*	*
Social variables				
Number of people in the household			-	
Ratio of working adults to children		+		
If have been member of a community organisation		*		*
If have participated in community forestry project				*
Time family lived in barangay		+	+	
Household resource variables				
Total household cash income	-			
Proportion of income from farming		+		
If own some portion of farming land	*	*	*	*
Proportion of farm land owned	-	-	-	-
If own some portion of farming land suitable for growing rice			*	*
Size of all household land			-	-
Size of owned land			-	-
Size of household land with moderate to steep slope		-		-
Number of farming plots used				-
Farming system variables				
Proportion of household land with moderate to steep slope		-		
Total distance to farm plots	-	-	-	-
Average distance to farm plots	-	-	-	-
Proportion of total food produced			*	*
Tree management variables				
If know how to register trees	*			
Use materials from public lands	*		*	
Use materials from public lands in the past	*			*

Notes: the symbols '+' and '-' indicate the direction of correlation between continuous variables, while the '*' indicates significant relationships ($p < 0.05$) between a scale and a categorical variable

One statistical result that contradicts the hypothesis offered above (i.e. that households with higher levels of financial security are more interested in tree management activities) is the negative correlation observed between the level of remittances received by the household and their ratings for the importance of both ‘immediate’ and ‘long-term’ reasons for tree planting and management. Poverty is strongly associated with agriculture in the Philippines (see Chapter 2 for details), and it may be that the households which are not as reliant on producing food and income from their farming activities are not as motivated to undertake tree planting to improve their livelihood as those who are more dependent on their land management activities to support the household. The proportion of income from farming was found to be positively correlated with the degree of importance attached to ‘planting support’ as a constraint to tree planting and management. This suggests that households in the communities surveyed which are highly dependent on their farm land to produce their livelihood perceive the risks associated with tree planting to be high.

The rating of importance given to potential constraining factors to tree management varied significantly between the various communities for three of the four constraint scales that have been constructed, with households from Poting Bato consistently rating the importance of constraints to tree management higher than households from other communities. These differences reinforce the significant differences that were identified in socioeconomic circumstances of households in the various communities described in Chapter 10, and the relationships between resources and attitudes described in this chapter. The former analyses revealed that sample households in Poting Bato are significantly worse off than those in other communities in terms of the resources they have to provide their livelihood.

The relationships between present and past use of materials, including timber resources, from public lands, support the findings of past research which has reported that households that can access timber from native forests are less likely to plant trees on their own lands (Ponce and Bangi 1988). Those households that are using materials from public lands rated the importance of both reasons for tree planting and management lower than those who do not or have not used these resources (Table 11.34). Those who still use public land materials rate the constraint scale ‘financial viability’ significantly higher than those that do not, yet they are less concerned about the potential difficulties involved in protecting their trees. In addition, those that have used public land materials in the past are less concerned about both ‘tree protection’ and ‘tenure and space’ issues than those who have not used these materials.

Table 11.34: Significant relationships between scales of reasons for tree management and socioeconomic variables

Socioeconomic variable	**Immediate reasons for tree management**	**Long-term reasons for tree management**
Proportion of staple food produced	*	*
Proportion of total food produced	*	*
House construction materials		*
Use materials from public lands	*	*
Use materials from public lands in the past	*	*
If have been member of a community organisation	*	
If below poverty line	*	
Remittance amount average per year	-	-
Tree planting density	+	
Proportion of household land with moderate to steep slope	-	

Notes: the symbols '+' and '-' indicate the direction of correlation between continuous variables, while the '*' indicates significant relationships ($p < 0.05$) between a scale and a categorical variable

11.4 SUMMARY

This chapter has identified a large and diverse number of relationships between the ratings of importance for the various scales of potential reasons for and constraints to tree management and the socioeconomic and behavioural characteristics of the sample households These relationships, along with those identified in Chapter 11, .provide indications of the motivations and constraints of households in the surveyed communities in relation to forestry development. The findings are consistent with previous research, and consistent with theoretical understanding of the relationships between socioeconomic characteristics, attitudes and behaviour. The fact that the relationships identified are broad ranging and consistent with previous research and theory provides support for the concept of developing typologies based on patterns in the attitudinal profile of the respondents.

Chapter 12

RELATIONSHIPS BETWEEN HOUSEHOLD'S SOCIOECONOMIC CHARACTERISTICS AND THEIR PRESENT TREE MANAGEMENT BEHAVIOUR

Relationships between attitude to forestry and socioeconomic characteristics of households are complex as seen from the previous chapter. Understanding the relationships between the socioeconomic characteristics of households and their tree planting and management behaviour is needed to construct an understanding of the interrelationships between attitude, circumstances and behaviour. Such understanding is also critical in aiding the development, interpretation and validation of a typology of rural households in relation to forestry activity.

A series of tests were used to determine the relationships between tree planting behaviour and intended behaviour and the socioeconomic variables included in the questionnaire. Tests between each of these summary variables of present behaviour and socioeconomic variables that are significant at the 10% confidence level are reported in the following sections. A summary of the results of all the tests that were undertaken is included in Appendix C. Tests of relationships between socioeconomic variables and tree management intentions of households are described in the following chapter.

12.1 RELATIONSHIPS BETWEEN THE VARIABLE 'IF PRESENTLY MANAGING TREES' AND SOCIOECONOMIC VARIABLES

Respondents were asked a number of questions about their tree planting and management activities including whether trees are present on the land they manage, whether the trees they are presently managing were planted or regenerated naturally, the names of the species involved, the number of trees of each species grown, the age of the trees, the types of intended use for them, timing of the harvest for various products and the marketplace for various products. A series of summary variables relating to tree planting and management behaviour and intentions were calculated.

As described in Chapters 3 and 7, a number of socioeconomic characteristics are associated with higher levels of tree planting and management activity. Theories relating to the adoption of new practices and theories describing the process leading to the development of sustainable land management practices suggest that before adopting a new practice, people must first develop an awareness of the need for the practice. Following this awareness, they then decide whether the practice is suitable for them. In practical terms, as tree planting and management is a long-term activity requiring substantial investments in the early years, present involvement in commercial tree farming by small-scale farming households is likely to require control of a high level of resources including land and cash reserves. Even relatively small investments in activities that have long-term payback periods are thought to require that the household have a relatively secure livelihood.

The most basic summary statistic for tree planting was an assessment of whether the household reported presently managing trees on their landholdings. Tests examining differences in socioeconomic variables between those who have trees and those who have not revealed relationships between the ownership status, size, number of plots, and types of crops grown on land controlled by the household, plus relationships between tree management and membership of community organisations, the community where the household is located, and the use of materials from public lands in the past (Tables 12.1 and 12.6).

Table 12.1: Chi Square tests between ‘whether presently managing trees’ and socioeconomic categorical variables

Variable	d.f.	Pearsons Chi Square	Probability
Cropping types	5	30.391	0.000
Intend to plant trees	1	5.882	0.015
Presently growing timber for sale	1	5.788	0.016
Number of farming plots used	3	9.113	0.028
If have own land	1	4.413	0.036
If ever been member of a community organisation	1	4.288	0.038
Community	3	7.733	0.052
Used resources from public land in the past	1	2.942	0.086

Those who have no farm land or only rice land are least likely to be presently managing trees, while those with rice land and other cropping land as well are more likely to have presently managing trees (Table 12.2). Those who already have trees growing on land they manage are more likely to be intending to plant more trees than those who don’t presently have trees.

Table 12.2: Whether presently managing trees by types of cropping practiced

If presently managing trees	None	Coconuts only	Coconuts and vegetables	Rice and coconuts and or vegetables	Rice only	Vegetables only	Total
Yes	4	28	30	71	7	20	160
No	7	2	8	13	9	3	42
Total	11	30	38	84	16	23	202

Those households who have a member that has been a member of a community organisation are more likely to be presently managing trees (Table 12.3), as are those who have their own at least some of the land they farm (Table 12.4), and those who reported having used public land resources in the past (Table 12.5).

Table 12.3: If ever household been a member of a community organisation by whether presently managing trees

	Whether household ever been a member of a community organisation		
Whether presently managing trees	Yes (%)	No (%)	Total (%)
Yes (%)	55	45	100
No (%)	37	63	100
All respondents (%)	51	49	100

Table 12.4: Whether household owns some of the land managed by the household by whether presently managing trees

	If have own land		
Whether presently managing trees	Yes (%)	No (%)	Total (%)
Yes (%)	61	39	100
No (%)	43	57	100
All respondents (%)	57	43	100

Table 12.5: Whether household used public land resources in the past by whether presently managing trees

	Used public land resources in the past		
Whether presently managing trees	Yes (%)	No (%)	Total (%)
Yes (%)	41	59	100
No (%)	26	74	100
All respondents (%)	38	62	100

Those who live in Tigbao and Conalum are more likely to have presently managing trees than those in Rizal II and Poting Bato.

Tests between whether the household presently has trees on land they manage and continuous variables were undertaken using one way analysis of variance (Table 12.6). Only two relationships were identified at a significance level of less than 0.1.

Table 12.6: One way AVOVA tests between 'whether household presently manages trees' and continuous socioeconomic variables

Variable	Sum of Squares	df	Mean Square	F	Sig.
Proportion of farm land owned	0.528496	1	0.528	2.750	0.099
Size of all household land	0.838813	1	0.839	3.737	0.055

Table 12.7: Proportion of farm land managed that is owned by households by whether presently managing trees

Whether presently managing trees	N	Mean proportion of land owned (%)	Std dev.
Yes	159	45	0.442
No	42	32	0.426
All respondents	201	43	0.440

Table 12.8: Mean size of all household land (ha) by whether presently manage trees

Whether presently manage trees	N	Mean land area (ha)	Std dev.
Yes	156	3.07	4.605
No	38	1.81	1.604
All respondents	194	2.81	4.193

The tests reported in this section confirm the findings of previous studies that have emphasised the importance of the awareness raising potential of community organisations, the effect of previous experience in forestry (as indicated by the relationship with those who have had previous experience gathering materials from public lands). The tests reported in this section also confirm the relationship between tenurial status and tree planting and management, and the importance of the level of land resources controlled by the household to allow investment in tree growing.

12.2 RELATIONSHIPS BETWEEN THE VARIABLE 'TREES MANAGED CATEGORIES' AND SOCIOECONOMIC VARIABLES

The presence or absence of trees on a households' land is a crude measure of tree planting and management activity that does not reveal any information about the intensity of activity. In this section, the tests that examined the relationships between various levels of tree planting activity and socio economic characteristics are described. Tests for relationships between socioeconomic characteristics and the various categories of tree management activity revealed a number of relationships (Table 12.9). The number of farm plots controlled (Table 12.14) as well as the tenure status of the land farmed (Table 12.11) were related to the level of tree management undertaken by the household, as was whether the household is presently growing timber for sale (Tables 12.13.). The values of other socioeconomic variables that differ between households in various tree planting categories include the types of construction material used for the house (Table 12.10), whether the household intends to plant trees in the future (Table 12.12), and whether the household sells livestock.

Table 12.9: Chi Square tests between 'total trees presently managed categories' and socio-economic categorical variables

Variable	d.f.	Pearsons Chi Square	Probability
Cropping types *	15	41.690	0.000
Number of farm parcels used	9	28.515	0.001
Have registered trees *	3	11.647	0.009
Community	9	20.003	0.018
If presently growing timber for sale	3	9.100	0.028
If have own land	3	9.004	0.029
If livestock sold	3	8.838	0.032
House construction materials	6	13.693	0.033
Intend to plant trees	3	8.446	0.038

* these tests used Fishers exact statistics as there were more than 25% of cells for these tests with an expected frequency of less than 5.

Table 12.10: Proportion of each trees presently managed category with various types of house construction material

	House construction materials			
Trees presently managed categories	Light materials (%)	Mixed materials (%)	Concrete (%)	Total
None (%)	33	51	15	100
1 to 20 (%)	39	45	16	100
21 to 100 (%)	45	27	29	100
More than 100 (%)	41	25	34	100
All respondents	81	72	50	203

Table 12.11: Percent of households in various 'trees presently managed' categories by whether households have their own farm land

Trees presently managed categories	If households owns some land Yes (%)	No (%)	Total (%)
None (%)	41	59	100
1 to 20 (%)	57	43	100
21 to 100 (%)	53	47	100
More than 100 (%)	70	30	100
All respondents	116	87	203

Table 12.12: Proportion of households in various trees presently managed categories by whether they intend to plant more trees

Trees presently managed categories	Intend to plant trees Yes (%)	No (%)	Total (%)
None (%)	66	34	100
1 to 20 (%)	68	32	100
21 to 100 (%)	75	25	100
More than 100 (%)	88	13	100
All respondents	151	49	200

Table 12.13: Proportion of households in various trees presently managed categories that are presently growing timber for sale

	If presently growing timber for sale		
Trees presently manage categories	Yes (%)	No (%)	Total (%)
None (%)	0	100	100
1 to 20 (%)	6	94	100
21 to 100 (%)	8	92	100
More than 100 (%)	19	81	100
Total N	20	183	203

Table 12.14: Proportion of households in various total trees presently managed categories with various numbers of farm plots

Total trees presently	Number of farming plots used				
manage categories	0 (%)	1 (%)	2 (%)	3 or more (%)	Total (%)
None (%)	10	49	23	18	100
1 to 20 (%)	0	31	51	18	100
21 to 100 (%)	0	39	39	22	100
More than 100 (%)	3	30	33	34	100
All respondents	5	73	76	35	203

Tests for relationships between tree planting and continuous socioeconomic variables (Table 12.15) revealed that both of the mean total land area controlled by households (Table 12.16) and the mean area they own themselves (Table 12.17) differ between the various tree planting categories. Those households who are presently managing more than 100 trees have more land than those in other categories (Tahmane test for multiple differences in the means, $p<0.05$, Table 12.16). The greater access to land is also reflected by the greater number of farm plots used by the households in the higher categories of present tree management activity (Table 12.18). Lastly, those households in the 'more than 100' category plan to sell more trees for timber than households in the other categories.

Table 12.15: One way AVOVA tests between total tree planting categories and continuous socioeconomic variables

If presently manage trees	Sum of Squares	df	Mean Square	F	Sig.
Total trees presently managed	79.84	2	39.913	313.923	0.000
Size of all household land	341.012	3	113.671	7.046	0.000
Size of owned land	1.59	3	0.530	3.647	0.014
Number of farming plots used	10.19	3	3.398	3.447	0.018
Number of trees planned to be sold	2.21	1	2.201	8.467	0.023

Table 12.16: Total area of land managed by households in various trees presently managed categories

Tree planting category	N	Mean land area (ha)	Std. Deviation
None	39	1.79	1.610
1 to 20	51	2.02	2.730
21 to 100	49	1.96	1.666
More than 100	64	4.72	6.431
All respondents	203	2.81	4.193

Table 12.17: Land area owned by the household by households in various trees presently managed categories

Tree planting category	N	Mean land area (ha)	Std. Deviation
None	39	0.72	1.227
1 to 20	51	1.03	2.055
21 to 100	49	0.97	1.481
More than 100	64	2.56	5.358
All respondents	203	1.44	3.376

Table 12.18: Number of farming plots used by households in various total trees presently managed categories

Tree planting category	N	Mean	Std. Deviation
None	39	1.49	0.914
1 to 20	51	1.80	0.722
21 to 100	49	2.02	1.127
More than 100	64	2.09	1.109
All respondents	203	1.89	1.011

12.3 RELATIONSHIPS BETWEEN 'TOTAL NUMBER OF TREES PRESENTLY MANAGED BY THE HOUSEHOLD' AND SOCIOECONOMIC VARIABLES

Another variable that can be used to assess the relationships between tree planting and management behaviour and socioeconomic characteristics of households is the total number of trees presently managed by the household. The results of tests revealing significant relationships between the total number of trees presently managed by the household and socioeconomic variables are reported in the following section.

There are significant differences in the number of trees presently managed by households between the communities who participated in the survey, with households in Rizal II presently managing significantly more trees than those in Conalum (Tamhane post-hoc test, p=0.011) (Tables 12.19 and 12.20).

Table 12.19: One way AVOVA tests between 'total trees currently managed per household' and categorical socioeconomic variables

Variable	Sum of Squares	df	Mean Square	F	Sig.
Presently growing timber for sale	7.522	1	7.522	13.135	0.000
If sell livestock	4.046	1	4.046	6.918	0.000
Proportion of staple food grown	7.455	3	2.485	4.283	0.006
Community	7.518	3	2.506	4.322	0.006
If intend to plant trees	4.210	1	4.210	7.070	0.009
If have own rice land	3.248	1	3.248	5.422	0.021
If have own transport	2.839	1	2.839	4.719	0.031
If own livestock	2.833	1	2.833	4.680	0.032
Number of farm parcels used	4.433	3	1.478	2.466	0.064
If use materials from public lands	2.089	1	2.089	3.413	0.067

A number of variables that are significantly related to the total number of trees presently managed by the household are measures of the size of land controlled by the household. These include total land size of the household, the size of owned land, rice-growing land and the number of farming parcels used by the household (Table 12.20). It is to be expected that as the size of household land increases, the area for tree planting activities and number of trees that are regenerating naturally will also increase.

Table 12.20: Mean total number of trees managed by the household by various categories of socioeconomic variables

Variable	Category	N	Total number of trees presently managed (mean)	Std deviation
Communities		46	120.7	211.48
	Puting Bato	40	347.3	841.94
	Rizal II	35	707.6	1492.64
	Tigbao	43	165.7	347.58
	All respondents	164	313.0	853.05
Proportion of staple food grown by the household	0 - 25%	75	411.6	898.11
	26 - 50%	31	149.8	383.95
	51 - 75%	31	79.6	123.09
	76 - 100%	27	494.4	1385.60
	All respondents	164	313.0	853.05
Whether presently growing timber for sale	Yes	19	1094.5	1852.99
	No	145	210.6	550.80
	All respondents	164	313.0	853.05
Whether intend to plant trees in the future	Yes	126	346.4	914.26
	No	36	212.6	619.91
	All respondents	162	316.7	857.68
Whether have own rice land	Yes	30	577.2	1343.84
	No	134	253.9	691.96
	All respondents	164	313.0	853.05
Whether has own transport	No	134	237.8	636.92
	Yes	30	649.0	1444.56
	All respondents	164	313.0	853.05
Whether livestock sold	Yes	64	354.1	747.58
	No	79	253.7	861.06
	All respondents	143	298.6	811.00
Whether intend to plant more trees	Yes	126	346.4	914.26
	No	36	212.6	619.91
	All respondents	162	316.7	857.68
Whether own livestock	Yes	121	367.1	941.26
	No	42	163.2	516.48
	All respondents	163	314.5	855.45
If presently use materials from public lands	Yes	43	158.2	362.23
	No	119	371.9	972.49
	All respondents	162	315.1	858.10

Table 12.20 (cont.): Mean total number of trees managed by the household by various categories of types of crops grown by the household

Variable	Value	N	Total trees presently managed (mean)	Std deviation
Types of crops grown by the household	None	5	9.4	5.27
	Coconuts only	28	268.6	752.81
	Coconuts and vegetables	31	592.3	1146.07
	Rice and coconuts and or vegetables	74	309.3	900.46
	Rice only	7	71.6	104.26
	Vegetables only	19	105.8	165.96
	All respondents	164	313.0	853.05

Another measure of the resources available to the household is their level of cash income. Both the average income per household member and the total household cash income are significantly positively correlated with the number of trees presently managed by the household (Table 12.21). A further measure of the resources of the household is the ownership of some type of transport. Those with transport are presently managing more trees than those without transport (Table 12.20). It is interesting to note that testing of the correlation between the total land size of the household and the total and per capita income of the household was not significant. There was a significant positive correlation, however, between the area of rice land controlled by the household and total household (p=0.006) and per capita incomes (p=0.072).

There are significant relationships between the variables 'if livestock sold' and 'if livestock owned' and the total number of trees presently managed by the household, indicating that those who own and or sell livestock are more likely to be presently managing a greater number of trees than those who do not own or sell livestock (Table 12.20). Other variables measuring the type of farming systems used by households with significant relationships with the total number of trees presently managed by the household include the types of crops grown by the household, and the proportion of staple food grown by the household (Table 12.20).

The scheme used to categorise the types of crops grown by households is strongly correlated with both the number of farming plots and the size of farming land managed by the households. Those with no farming plots have an average of less than 10 trees, presumably around their houses, contrasting with households who grow coconuts and vegetables, which have an average of nearly 600 trees per household. The relationship between the proportion of staple food grown by the household and the total number of trees managed by the household is non-linear in that the number of trees managed by the household does not increase consistently as the proportion of staple food grown increases. While the management of at least some area of rice growing land is associated with greater levels of tree management by households, those with only rice growing land have an average of only 70 trees per household (Table 12.20). Those who grow 0 – 25% of their staple food requirements have on average over 400 trees per household. This number drops to approximately 80 trees per household for those that grow 50-75% of their staple food requirements, while those growing 75-100% of their staple food needs manage an average of nearly 500 trees per household.

The number of trees managed by households is related to whether or not the household accesses materials from public land, with those currently using public land materials managing significantly less trees on their own land than those who do not use materials from public lands (Table 12.20). Finally, the intention to plant more trees is significantly related to the number of trees already managed by the house, indicating that those with higher numbers of trees at present are more likely to be planning to plant more trees, and those with more trees presently are planning to plant a greater number of trees (Table 12.21).

Table 12.21: Results of testing for correlations between the total number of trees presently managed by the household and other variables

	Pearson Correlation	Sig. (2-tailed)	N
Size of all household land	0.384	0.000	164
Number of trees planned to be sold	0.319	0.000	164
Size of owned land	0.292	0.000	164
Intended number of tree to be sold for timber	0.885	0.002	9
Total distance to plots transformed	0.233	0.004	151
Size of rice growing land	0.214	0.006	164
Average income per member transformed	0.194	0.013	162
To improve water quality	0.191	0.015	163
Total household cash income	0.178	0.023	162
Average distance to plot	0.177	0.031	148
Size of household land with moderate to steep slope	0.159	0.042	164
Number of farming plots used	0.159	0.042	164
Trees intended plant	0.180	0.048	121
Potential damage to trees from typhoons	0.135	0.086	162

12.4 RELATIONSHIPS BETWEEN 'TREE DENSITY ON HOUSEHOLD LAND' AND SOCIOECONOMIC VARIABLES

The tree density was calculated for each household by dividing the total number of trees presently managed by the household by the total land size managed by the household. Testing of the relationships between tree planting density and socioeconomic variables revealed several significant relationships (Table 12.22). As expected both the total number of trees presently managed and the total land size managed by the household are both significantly correlated with tree planting density. Tree density was also positively correlated with the intended number of trees to be sold for timber by the household, and with the average income per household member (Table 12.22).

Table 12.22: Correlations between tree density and continuous socioeconomic variables

	Pearson Correlation	Sig. (2-tailed)	N
Total trees presently managed	0.802	0.000	159
Total land size managed	-0.208	0.008	159
Intended number of tree to be sold for timber	0.718	0.029	9
Average income per member	0.145	0.069	157

Testing between tree density and categorical variables revealed only two significant relationships (Tables 12.23 and 12.24). Households with differing types of construction materials have different tree densities on the land they manage, with those with housing made of light materials having higher densities than those with houses constructed of mixed materials (p=0.08).

Table 12.23: Tree density by various types of house construction materials

House construction material	N	Mean tree density	Std. Deviation
Light materials	65	178.4	388.95
Mixed materials	51	44.7	55.77
Concrete	43	130.4	209.40
All respondents	159	122.5	277.81

The tree density on land managed by households was also found to vary between households that produced different proportions of their own staple foods (F=5.226, p=0.002) (Table 12.24). The source of the difference is that households that produce 0-25% of their staple food have significantly higher tree density than households that produce 50-75% of their own staple food (p=0.001).

Table 12.24: Tree management intensity by the proportion of staple food requirements that is produced by households

Proportion of staple food produced	N	Mean	Std. Deviation
0 - 25%	81	145.6	326.15
26 - 50%	37	124.8	277.35
51 - 75%	27	67.6	110.10
76 - 100%	14	88.9	188.05
All respondents	159	122.5	277.81

12.5 RELATIONSHIPS BETWEEN 'WHETHER PRESENTLY GROWING TREES FOR TIMBER FOR SALE' AND SOCIOECONOMIC VARIABLES

As described in Chapter 10, only 20 respondents, or approximately 10% of households surveyed, indicated that they were presently growing trees to produce timber for sale, with no significant differences between the various communities. Tests for relationships between those who are presently growing timber for sale, those who are not, and socioeconomic characteristics were significant in terms of many variables. The results of these tests are presented in Tables 12.25 and 12.28. The values of the variables associated with those tests are reported in Tables 12.26, 12.27 and 12.29.

Table 12.25: Whether presently growing timber for sale by categorical socio economic variables

Variable	d.f.	Chi Square	Probability
Highest education category	2	13.468	0.001
If ever been member of a community organisation	1	10.280	0.001
Intend to plant for timber	1	14.346	0.001
Know how to register trees	1	12.375	0.002
If have own transport	1	11.306	0.003
Interested in commercial tree farming	1	7.761	0.003
Intend to plant trees	1	7.211	0.003
If ever participated in a community forestry program	1	7.751	0.006
Used resources from public land in the past	1	5.425	0.020
Number of presently managed trees categories	3	9.100	0.028
Number of farm parcels used	3	9.035	0.029
If livestock sold	1	3.946	0.042
Have registered trees	1	6.886	0.054

The land size used for farming by households and their access to a number of farm plots were again significant as for those presently managing trees or not (Tables 12.25 and 12.29). A number of additional characteristics were also significant, with those growing timber:

- Having higher measures of income, including remittances, farming income as well as gross household income and average income per household member;
- More likely to have involvement with community organisations;
- More likely to have participated in community forestry programs;
- Having higher levels of education in the household;
- Having greater average distance to farming plots used by the household; and
- Being more likely to have used public land resources in the past.

Table 12.26: Percentage of households presently growing timber for sale and those who are not in various categories of categorical socioeconomic variables

Socioeconomic variable		Whether presently growing timber for sale Yes (%)	No (%)	Total
Whether livestock sold	Yes (%)	63	40	42
	No (%)	37	60	58
	Total (%)	100	100	100
Have registered trees	Yes (%)	11	1	2
	No (%)	89	99	98
	Total (%)	100	100	100
Whether ever been member of a community organisation	Yes (%)	85	47	51
	No (%)	15	53	49
	Total (%)	100	100	100
Intend to plant for timber	Yes (%)	60	21	25
	No (%)	40	79	75
	Total (%)	100	100	100
Know how to register trees	Yes (%)	45	14	17
	No (%)	55	86	83
	Total (%)	100	100	100
Whether have own transport	Yes (%)	45	15	18
	No (%)	55	85	82
	Total (%)	100	100	100
Interested in commercial tree farming	Yes (%)	90	58	61
	No (%)	10	42	39
	Total (%)	100	100	100
Intend to plant trees	Yes (%)	100	74	77
	No (%)	0	26	23
	Total (%)	100	100	100
Whether ever participated in a community forestry program	Yes (%)	68	36	39
	No (%)	32	64	61
	Total (%)	100	100	100
Used resources from public land in the past	Yes (%)	63	36	38
	No (%)	37	64	62
	Total (%)	100	100	100

As expected, those who are presently growing trees for timber have a greater interest in commercial tree farming, and better knowledge of how to register trees. Finally, they are also more likely to have lived in the barangay longer than those who are not presently managing trees for timber (Table 12.29).

Table 12.27: Proportion of households that are presently growing timber for sale and those who are not in various categories within categorical socioeconomic variables

		If presently grow timber for sale		
		Yes (%)	No (%)	Total
Number of presently managed trees categories	No trees	0	21	19%
	1-20 trees	16	26	25
	21 - 100 trees	21	25	24
	> 100 trees	63	28	32
	Total	100	100	100
Number of farm parcels used	0	0	2	2
	1 plot	10	39	36
	2 plots	45	37	37
	3 or more plots	45	22	24
	Total	100	100	100
Highest education category	Elementary	15	29	28
	High school	40	58	56
	College or postgraduate	45	13	16
	Total	100	100	100

Table 12.28: One way ANOVA tests between 'whether presently growing timber for sale' by socio-economic variables

Presently growing timber	Sum of Squares	df	Mean Square	F	Sig.
Size of owned land	290.3083	1	290.308	29.008	0.000
Size of all household land	4.334219	1	4.334	21.013	0.000
Total trees presently managed or managed	7.522098	1	7.522	13.135	0.000
Total distance to farm plots	2.437809	1	2.438	9.882	0.002
Number of farming plots used	6.169589	1	6.170	9.293	0.003
Household gross yearly income	1.94E+10	1	1.216	6.832	0.010
Average income of each household member	1.341687	1	1.342	5.490	0.020
Farming income total	1.002738	1	1.003	4.694	0.032
Remittance amount average per year	1.09E+09	1	1.875	4.136	0.046
Average distance to plots	0.841834	1	0.842	3.933	0.049
Time household established in barangay	940.3974	1	940.397	3.099	0.082
No of trees intended to harvest for timber	319116.8	1	0.003	0.007	0.935
Number of trees planned to be sold	2707251	1	0.000	0.000	1.000

Table 12.29: Values of categorical socioeconomic variables with significant differences between those presently growing timber for sale and those who are not

Variable	If presently growing trees for sale	N	Mean value	Standard Deviation
Total trees presently managed	Yes	19	1094.47	1852.99
	No	145	210.60	550.80
	Average	164	313.00	853.05
Total number of trees intended to plant	Yes	13	489.08	822.79
	No	137	225.42	693.97
	Average	150	248.27	706.85
Household gross yearly income (Pesos)	Yes	20	81060.80	94647.57
	No	183	48264.29	47433.36
	All respondents	203	51495.48	54458.81
Average income of each household member (Pesos)	Yes	20	25938.68	47953.93
	No	183	13204.60	18472.23
	All respondents	203	14459.19	23199.34
Remittance amount average per year (Pesos)	Yes	19	12447.37	20377.61
	No	181	4783.47	13891.21
	All respondents	200	5511.54	14736.93
Farming income total (Pesos)	Yes	17	22532.82	12736.93
	No	164	17097.36	15761.52
	Average	181	17607.87	15553.51
Size of owned land (ha)	Yes	20	5.06	9.05
	No	183	1.04	1.58
	All respondents	203	1.44	3.38
Size of household land with moderate to steep slope (ha)	Yes	20	2.67	3.64
	No	183	1.13	2.15
	All respondents	203	1.28	2.37
Size of all household land (ha)	Yes	20	8.23	10.00
	No	183	2.22	2.35
	All respondents	203	2.81	4.19
Number of farming plots used	Yes	20	2.35	0.67
	No	183	1.78	0.81
	All respondents	203	1.84	0.81
Average distance to plot (km)	Yes	20	2.30	2.09
	No	158	1.61	2.69
	Average	178	0.03	0.47
Ratio of labour to land size (working people per ha of land managed by the household)	Yes	20	2.43	5.03
	No	174	7.03	22.94
	All respondents	194	6.56	21.82

Tests for relationships between the number of trees planned to be sold and socioeconomic variables revealed that those who have their own transport, own some land suited to rice-growing, manage a higher number of farming plots and have participated in community forestry programs are planning to sell greater number of trees than those households that do not have these characteristics (Tables 12.30 and 12.31).

Table 12.30. One-way ANOVA tests between the number of trees planned to be sold by households and socioeconomic variables

	Sum of Squares	df	Mean Square	F	Sig.
If have own transport	1074311	1	1074311.2	13.970	0.000
Intend to plant to produce timber	712989.4	1	712989.4	9.060	0.003
If have own rice land	597671.2	1	597671.2	7.539	0.007
Number of farming plots used	1046053	5	209210.6	2.661	0.024
If participated in community forestry program	397635.9	1	397635.9	4.853	0.029
If member of community organisation	284749	1	284749.0	3.471	0.064
Household construction materials	437840.9	2	218920.4	2.721	0.068

Table 12.31. Values of continuous socioeconomic variables with significant relationships with the number of trees planned to be sold by households

Variable	Category	Mean number of trees	Std. Deviation
Whether have own transport	No	4.4	30.3
	Yes	194.9	661.3
	All respondents	38.2	286.1
Whether member of community organisation	No	0.3	2.5
	Yes	75.7	401.0
	All respondents	38.8	288.2
Whether participated in community forestry program	No	0.2	2.3
	Yes	93.3	459.8
	All respondents	36.4	289.1
Whether have own rice land	No	12.6	108.8
	Yes	153.1	623.2
	All respondents	38.2	286.1
Whether presently manage timber for sale	No	0	0
	Yes	387.5	853.0
	All respondents	38.2	286.1
Whether intend to plant to produce timber	No	3.8	29.4
	Yes	140.5	560.1
	All respondents	38.2	286.1
Household construction materials	Light materials	23.1	162.8
	Mixed materials	0	0
	Concrete	117.5	534.0
	All respondents	38.2	286.1
Number of farming plots used	0	0	0
	1	2.0	17.6
	2	21.5	157.3
	3	101.4	591.4
	4	35.7	94.5
	5	433.0	644.6
	All respondents	38.2	286.1

12.6 RELATIONSHIPS BETWEEN PARTICIPATION IN COMMUNITY FORESTRY PROGRAMS AND SOCIOECONOMIC VARIABLES

Respondents were asked to indicate if any members from the household had participated in a community forestry program. Approximately 40% of households have participated in community forestry programs (Table 12.32).

Table 12.32: Proportion of households' who have participated in a community forestry project

	Frequency	Percent	Valid Percent	Cumulative Percent
No	118	58.1	61.1	61.1
Yes	75	36.9	38.9	100.0
Total	193	95.1	100.0	
Missing	10	4.9		
Total	203	100.0		

Tests were undertaken to assess whether there are significant differences in socioeconomic characteristics between those who have and have not participated in community forestry projects. The strongest relationship between categorical variables and participation in community forestry programs is with membership of community organisations (Table 12.33). This is to be expected, as membership of community organisations is required before participating in community forestry programs under the guidelines of the Community Based Forest Management Agreements.

Other socioeconomic variables showing relationships with participation in community forestry projects include the level of present activity and interest in commercial tree farming, knowledge about how to register trees, and the use of materials from public lands. Some trends ($p<0.1$) were found between the numbers of farming parcels used, the intention to plant in the future, and community development priorities of the respondents (Table12.33 and 12.34). Those involved in community forestry programs tend to operate a greater number of farming plots and intend to plant a greater number of trees than those not involved in community forestry programs.

Table 12.33: Participated in a community forestry program by categorical socioeconomic variables

Variable	d.f.	Chi Square statistic	Probability
If ever been member of a community organisation	1	54.172	0.000
If intend to plant for timber	1	12.314	0.000
Interested in commercial tree farming	1	9.065	0.003
Presently growing timber for sale	1	7.751	0.005
Know how to register trees	1	4.566	0.033
If use materials from public lands	1	4.448	0.035
Number of farm parcels used	3	7.563	0.052
Intend to plant trees	1	3.568	0.059
Community development needs	8	13.672	0.091

Table 12.34: If participated in community forestry programs by highest priority in community development needs

	If participated in community forestry programs		
Community development needs	Yes (%)	No (%)	Total (%)
Potable water supply	13	16	14.8
Education/training	13	7	9.3
Road development	20	34	28.6
Irrigation/drainage	6	7	6.6
Livelihood programs	24	14	18.1
Health services	1	7	4.9
Community cooperation	11	5	7.1
Forest protection	7	5	5.5
Other	4	4	4.9

Statistical tests between those who have and have not participated in community forestry programs and continuous variables revealed that those who have been involved in community forestry programs manage a greater area of farming land than those who have not been involved in community forestry programs (Table 12.35). Those involved in community forestry programs tend to have a greater interest in education and training, livelihood programs and community cooperation, and less interest in road development and health services than those who have not been involved in community forestry programs. Those involved also tend to have a greater number of children, and more children not at school than those not involved (Table 12.36).

Table 12.35: One way ANOVA tests between 'if participated in community forestry project' by socioeconomic variables

Variable	Sum of Squares	df	Mean Square	F	Sig.
Number of children below 12 not at school	8.650742	1	8.651	9.237	0.003
Number of children below 12	15.248879	1	15.249	6.840	0.010
Year stopped using public lands	363.7436	1	363.744	4.681	0.035
Area of all household land	0.91176	1	0.912	4.163	0.043

Table 12.36: Mean values for continuous variables significantly different between those households who have and have not participated in community forestry programs

Variable	Participated in community forestry programs	N	Mean	Std. Deviation
Number of children (below 12)	Yes	73	1.93	1.76
	No	113	1.35	1.29
	Average	186	1.58	1.52
Number of children under 12 not at school	Yes	70	0.97	1.25
	No	111	0.52	0.74
	Average	181	0.70	0.99
Area of all household land (ha)	Yes	75	3.31	5.043
	No	118	2.25	3.447
	Average	193	2.66	4.161
Years since stopped using public lands	Yes	22	17.09	9.335
	No	31	11.77	8.433
	Average	53	13.98	9.122

12.7 SUMMARY OF SOCIOECONOMIC DIFFERENCES ASSOCIATED WITH VARIATIONS IN PRESENT TREE PLANTING AND MANAGEMENT BEHAVIOUR

Data about the current tree planting and management activities of households revealed that households in all the communities commonly grow trees to meet their own timber requirements, and that the practice of growing timber products for sale is uncommon among households from the communities involved in the survey.

The differences in tree planting and management between the communities appear to support the conclusions of past studies about the nature of the relationship between tree planting and management behaviour and certain socio-economic characteristics, including the area of land farmed by the household, their income level, livelihood sources, and education levels. For example, significant differences were identified between the intentions to plant trees in the future with households from Poting Bato being less likely to be intending to plant trees in the future than households in the other communities, and households in Poting Bato have on average the lowest incomes, the least access to land, the lowest education levels and least permanent housing. It is important for those seeking to promote the development of small-scale forestry to understand whether the differences in activity between households is driven more by factors relating to the whole community, such as infrastructure development, or whether the differences can be attributed to differences in socioeconomic characteristics of individual households.

The results of previous studies, reviewed in Chapter 7, are broadly consistent with the findings from this study concerning the relationships between the socioeconomic characteristics of households and their tree planting and management behaviour. These studies have concluded that higher levels of tree planting and management are associated with the characteristics listed in section 7.4.

In the following sections the relationships between socioeconomic variables and those indicating present tree management behaviour are reviewed by examining the topics of household resources, farming system variables, and social variables.

12.7.1 Relationships between Tree Planting and Management Activities and Household Resources

The tests between those who are presently managing trees and those who are not emphasise the importance of livelihood security in enabling households to undertake at least some tree management activity, with the land size and ownership of the household and their cash income significantly different between the 20% of households who have no trees and the 80% who have some. Approximately 45% of households are presently managing 20 trees or less. In general the level of resources controlled by the household increases with the number of trees they manage as indicated by the greater number of socioeconomic characteristics that are significantly different between those who are more or less active in terms of their tree planting and management. Households that are presently managing greater numbers of trees than average, such as those presently growing timber for sale, have characteristics that indicate higher levels of well-being in a household including ownership of transport and more permanent house construction materials.

A number of socio economic variables were found to have significant relationships with the respondents present tree planting and management behaviour (Tables 12.37 to 12.41). Those variables that are positively associated with present tree management were predominantly related to resource and income measures as illustrated in Table 12.37.

Table 12.37: Summary of correlations between the number of trees presently managed by the household and continuous socioeconomic variables

Socioeconomic variables	Number of trees presently managed
Total household income	+
Average income per member	+
Total land size	+
Size of owned land	+
Size of rice land	+
Size of land with moderate to steep slope	+
Number of farm plots	+
Number of trees intended to plant	+
Total distance to plots	+
Average distance to plot	+
Number of tree to be sold for timber	+

Note: '+' indicates a positive correlation was found between the variables

The resource variables that differ between households with varying tree management behaviour include the total household cash income of the household and average income per member, the total area of the landholding managed by the household, and the size of land managed by the household. It is to be expected that the number of trees managed by a household will increase with the size of the landholding due to the space available.

Table 12.38: Categorical socioeconomic variables with significant relationships to continuous variables indicating present tree planting and management behaviour

Variable	Total number of trees presently managed	Total number of trees presently growing for sale as timber
Intend to plant trees	*	
Number of farming plots used	*	*
Whether ever been member of a community organisation		*
Community	*	
House construction materials		*
Whether livestock sold	*	
Whether own livestock	*	
Whether intend to plant for timber		*
Whether have own transport	*	*
Whether ever participated in a community forestry program		*
Whether have own rice land	*	*
Whether presently growing timber for sale	*	*
Proportion of staple food grown	*	
If use materials from public lands	*	

Note: '*' indicates a significant differences were found between categories of socioeconomic variables and their present tree management behaviour

A number of the differences in socioeconomic measures between those who are presently managing trees are described by community members, as those characteristic of households with higher well-being status. These characteristics include the ownership of some land suitable for rice growing, the ownership of transport, and ownership of higher proportions of the household land that is managed (see Chapter 8 for details). The degree of difference between households increased when comparing households that are presently growing timber for sale and those who are not. Differentiating characteristics in this case included differences in education levels and household construction materials as well (Table 12.38). The present management of trees is associated with greater levels of awareness about tree registration regulations, and those presently managing trees for sale as timber are more likely to have actually registered their trees. Those who are presently growing trees are more likely to have had some involvement with community organisations and have participated in community forestry programs than those who are not presently managing trees.

Table 12.39: Categorical socio economic variables with significant relationships to variables indicating present tree planting and management behaviour

Variable	If presently managing trees	Total tree planting categories	Presently growing timber for sale
Cropping types	*	*	
Intend to plant trees	*	*	*
Presently growing timber for sale	*		
Number of farming plots used	*	*	*
If have own land	*	*	
If ever been member of a community organisation	*		*
Community	*	*	
House construction materials		*	
If livestock sold		*	*
If presently growing timber for sale		*	
Highest education category			*
Intend to plant for timber			*
Have registered trees		*	*
Know how to register trees			*
If have own transport			*
Interested in commercial tree farming			*
If ever participated in a community forestry program			*
Used resources from public land in the past	*		*
Number of presently managing trees categories			*
Interested in commercial tree farming			*

Note: '*' indicates a significant differences were found between categories of socioeconomic variables and their present tree management behaviour

The relationships between the households cash income and the area of the land they manage is not straightforward. As discussed in Chapter 2, poverty in the Philippines is strongly linked to agriculture, with households in rural areas more likely to be below the poverty threshold than urban households due to a number of factors including the low prices received for agricultural products and the lack of opportunities for employment outside agricultural industries (Balisacan 1996, Balisacan and Pernia 2002). Tests of the correlations between a households' cash income and the size of land they manage indicate that the total land size managed by the household is not correlated to the income of the household at a significant level (Table 12.41). The strongest correlation with household income is a negative correlation with the proportion of income from farming. The size of land suitable for rice growing that is managed by the household is, however, positively correlated with the households' income, as is the proportion of land managed by the household that is owned by them.

Table 12.40: Significant relationships between 'if presently managing trees', 'if presently growing timber for sale' by socioeconomic variables

Independent variable	If presently managing trees	If presently growing timber for sale
Household gross yearly income	*	*
Average income of each household member		*
Farming income total		*
Time household established in barangay		*
Remittance amount average per year		*
Size of owned land		*
Size of all household land		*
Proportion of farm land owned	*	
Total trees presently managed		*
No of trees intended to harvest for timber		*
Total distance to farm plots		*
Average distance to plots		*
Number of farming plots used		*

Note: '*' indicates a significant differences were found between categories of socioeconomic variables and their present tree management behaviour

Table 12.41: Correlations between household gross yearly income and other socioeconomic variables including households' land area of various types, the proportion of income from farming and land owned

Variable	N	Pearson Correlation	Sig. (2-tailed)
Proportion of income from farming	201	-0.343	0.000
Proportion of farm land owned	201	0.225	0.001
Size of rice growing land	203	0.194	0.006
Number of farming plots used	203	0.133	0.058
Proportion of moderate to steep land	194	-0.118	0.100
Size of owned land	203	0.033	0.645
Size of all household land	203	0.013	0.856
Size of household land with moderate to steep slope	203	-0.006	0.931

12.7.2 Relationships between Tree Planting and Management Activities and Household Farming Systems

Several variables relating to the type of farming system practiced by the household indicated some of the interactions between present farming activities and the tree planting and management activities undertaken by the household. The average distance to the plot was significantly different between those households' that presently managing trees and those who do not, reflecting that tree planting takes place on farming plots more remote from households. The ownership and sale of livestock is positively related to tree planting and management activity. The access to greater number of farming plots, which it self is highly correlated with size of farming land that is managed by the household, is also associated with greater levels of present tree management.

12.7.3 Relationships between Tree Planting and Management Activities and Social Variables

Several variables relating to 'social' variables were significantly related to the present tree management activities of households. These include membership of community organisations, participation in community forestry programs, and the highest education level in the household. The higher than average participation in forestry activities by those involved in community organisations and those involved in community forestry organisations is to be expected. It is not possible to determine whether membership of community organisations or participation in community forestry programs caused the increased forestry activity. It can be said, however, that the community organisations and community forestry programs do provide a focal point for those interested in forestry development in the communities.

Those households that are presently growing timber for sale are likely to have higher levels of formal education than those who are not. As the cash income level of the households is also significantly positively related to the education levels in the household it is difficult to determine if the relationship between education levels and commercial tree growing is causal. To determine the interrelationships between economic and social characteristics of households it is necessary to undertake multivariate tests to see how they combine.

Chapter 13

RELATIONSHIPS BETWEEN HOUSEHOLD'S TREE MANAGEMENT INTENTIONS AND THEIR SOCIOECONOMIC CHARACTERISTICS

Being able to estimate the likely impact of forestry development programs on different types of households requires an understanding of the intended tree planting activities of households. The analysis of relationships between the variables constructed to summarise a household's tree planting and management intentions and those relating to the socioeconomic characteristics of the household provide an indication of the importance of various motivations for and constraints to forestry development, and are detailed in the following chapter. Each section examines the relationships between one of the summary variables of households' tree management intentions and the socioeconomic characteristics of households. The chapter concludes with a summary discussion of the main findings from the analyses.

13.1 HOUSEHOLDS TREE PLANTING AND MANAGEMENT INTENTIONS

During the household interviews, respondents were asked a series of questions relating to their proposed tree planting activities on the land that they manage. Several variables were used to measure the households' tree planting and management intentions. Once household summary variables were constructed, a series of tests were undertaken to assess whether there are significant relationships between socioeconomic characteristics of the households and their tree planting and management intentions.

Respondents were generally enthusiastic about the possibility for further tree planting on their land with 75% indicating they would undertake planting. Analysis of the data was complicated by missing values as 54 of the 159 households who said they intended to plant trees in the future did not specify the number of trees they would establish. The average number of trees that households stated they wish to establish is 234.

Respondents were also asked about the expected functions of the trees they intend to plant, including whether they would sell all or part of the timber they harvest. A total of 127 respondents (62%) indicated they would harvest some timber from the trees they intend to plant, mostly for household use. The mean number of trees that will be used for timber for those who intend to plant is approximately 200. A total of 52 respondents (25%) indicated they would sell at least a part of the timber harvested from trees they will establish in the future. The calculation of the numbers of trees they expect to sell was also complicated by missing data, with 12 of these respondents failing to specify the number of trees they would establish, and 15 of these respondents failing to specify the proportion of the species in question they would sell. The average number of trees households plan to sell is approximately 100. A small number of households (11 households in the sample), those whom expect to grow and sell over 200 trees each, expect to establish, grow and sell 90% of the 15,680 trees that all households in the sample reported intending to establish. In fact just 4 households are proposing to grow 50% of the total number of trees that will be offered for sale as timber.

13.1.1 Relationships between Socioeconomic Variables and If Intend to Practice Tree Planting and Management Activities in the Future

As for the households' present tree management activity, testing showed the level of resources controlled by the household is significantly related to the intention of households to plant and manage trees in the future (Table 13.1).

Table 13.1: Intend to plant by categorical socio-economic variables

Variable	d.f.	Pearsons Chi Square	Probability
Interested in commercial tree farming	1	47.841	0.000
If ever been member of a community organisation	1	14.379	0.000
Number of farm parcels used	3	18.776	0.000
Cropping types	5	18.611	0.002
If presently growing timber for sale	1	7.211	0.007
If presently manage trees	1	5.882	0.015
If have own land	1	5.694	0.017
Community	3	8.835	0.032
Number of trees presently managed categories	3	8.446	0.038
Proportion of staple food grown	3	8.346	0.039
Highest education category	2	6.406	0.041
Know how to register trees	1	3.811	0.051
If use materials from public lands	1	3.682	0.055
If ever participated in a community forestry program	1	3.568	0.059
Used resources from public land in the past	1	2.999	0.083

These resources include the land area managed by the household, the proportion of farm land managed by the household that is owned by them (Table 13.4 and 13.5), as well as the number, and also the type of crops grown on the plots (Tables 13.1 and 13.2).

Table 13.2: Percentage of households intending to plant trees by categorical variables

Variable	Category	Intend to plant trees No (%)	Yes (%)	Total (%)
Number of farm parcels used	0 parcels	57	43	100
	1 parcel	34	66	100
	2 parcels	19	81	100
	3 parcels	6	94	100
	4 parcels	0	100	100
	5 parcels	20	80	100
	All respondents	23	77	100
Cropping types	None	55	45	100
	Coconuts only	33	67	100
	Coconuts and vegetables	24	76	100
	Rice and coconuts and or vegetables	19	81	100
	Vegetables only	13	87	100
	All respondents	23	77	100
Tree presently managed categories	No trees	32	68	100
	1-20 trees	28	72	100
	21 - 100 trees	25	75	100
	> 100 trees	13	88	100
	All respondents	23	77	100
Community	Conalum	17	83	100
	Puting bato	36	64	100
	Rizal II	18	82	100
	Tigbao	20	80	100
	All respondents	23	77	100
Proportion of staple food grown	0 - 25%	32	68	100
	26 - 50%	9	91	100
	51 - 75%	19	81	100
	76 - 100%	17	83	100
	Average	23	77	100
Highest education category in household	Elementary	33	67	100
	High school	21	79	100
	College or postgraduate	12	88	100
	All respondents	23	77	100

In the case of intentions to plant trees, the tenure status of the land is also significant, with those having at least some of their own land more likely to be intending to plant trees, and those who intend to plant own a higher proportion of their land. The proportion of staple food produced by the household is also significant, with those producing 0 – 25% of their own staple food less likely to be intending to plant trees than those producing more of their own staple food (Table 13.2). Those households with higher education levels are more likely to be intending to plant trees. The present level of tree management activity is related to the intended behaviour of household's, with those households that are presently managing trees are more likely to be intending to plant trees in the future, particularly if they are already growing timber for sale.

Those who intend to plant trees are more likely to know how to register them. They are also more likely to have used materials from public lands in the past, or continue to do so (Table 13.3).

Table 13.3: Percentage of households in various categories of socioeconomic variables by if intend to plant trees

Variable	Category	Intend to plant trees		
		No (%)	Yes (%)	Total (%)
Interested in commercial tree farming	No	82	26	39
	Yes	18	74	61
	Total	100	100	100
If ever been member of a community organisation	No	73	41	48
	Yes	27	59	52
	Total	100	100	100
If presently growing timber for sale	No	100	87	90
	Yes	0	13	10
	Total	100	100	100
If presently manage trees	No	33	17	21
	Yes	67	83	80
	Total	100	100	100
If have own land	No	57	38	43
	Yes	43	62	58
	Total	100	100	100
Know how to register trees	No	92	80	83
	Yes	8	20	17
	Total	100	100	100
If use materials from public lands	No	84	69	73
	Yes	16	31	27
	Total	100	100	100
If ever participated in a community forestry program	No	72	57	61
	Yes	28	43	39
	Total	100	100	100
Used resources from public land in the past	No	70	59	62
	Yes	30	41	38
	Total	100	100	100

Those households managing a greater number of trees are more likely to be considering planting more trees in the future than the households presently managing less trees (Table 13.3). Finally, households which intend to plant trees in the future are more likely to have participated in a community organisation (Table 13.3).

Table 13.4: One way ANOVA tests between 'intend to plant trees' and socio-economic variables

Variable	Sum of Squares	df	Mean Square	F	Sig.
Number of farming plots used	13.00566	1	13.006	20.576	0.000
Total trees presently managed	4.20996	1	4.210	7.070	0.009
Household gross yearly income	1.10552	1	1.106	6.152	0.014
Proportion of farm land owned	1.021977	1	1.022	5.405	0.021
Size of all household land	1.158522	1	1.159	5.123	0.025
Size of owned land	43.21514	1	43.215	3.795	0.053

Table 13.5: Means values of variables with significant differences between those intending to plant more trees and those that do not

Variable	Intend to plant trees	Mean value	Standard Deviation
Number of farming plots used	No	1.39	0.88
	Yes	2.03	1.01
	All respondents	1.88	1.02
Total trees presently managed	No	224.97	636.20
	Yes	341.03	908.04
	All respondents	316.67	857.68
Household gross yearly income (Pesos)	No	38238.65	35415.21
	Yes	55406.48	58839.84
	All respondents	51457.88	54753.24
Proportion of farm land owned (%)	No	32	0.42
	Yes	46	0.44
	All respondents	43	0.44
Size of all household land (ha)	No	1.80	1.80
	Yes	3.13	4.67
	All respondents	2.82	4.22
Size of owned land (ha)	No	0.59	1.19
	Yes	1.71	3.78
	All respondents	1.45	3.40

13.1.2 Relationships between 'total number of trees intended to be planted by the household' and Socioeconomic variables

Tests of relationships between the variable 'total number of trees intended to be planted by the household' and socio economic variables revealed a number of significant relationships (Tables 13.6 and 13.9). Those households who have their own transport and those that have been involved with community organisations are planning to plant more trees than those without transport and who have not been involved with community organisations (Table 13.7). The land size of the household is positively correlated with the number of trees the household intends to plant, as is the number of farming plots managed by the household and their cash income (Table 13.9). Those households which manage some land they own intend to plant more trees than those who do not (Table 13.7). Those planning to plant trees for timber also plan to plant a greater number than those that do not (Tables 13.6 and 13.7)

Table 13.6: One way AVOVA tests between 'total number of trees households intend to plant' and socio-economic variables

Socioeconomic variable	Sum of Squares	df	Mean Square	F	Sig.
Interested in commercial tree farming	2391171	1	2391171	6.396	0.012
If have own land?	1420662	1	1420662	3.785	0.053
If have own transport?	1562186	1	1562186	4.170	0.042
If intend to plant to produce timber for sale?	20.443	1	20.443	18.450	0.000
Ecological problems in barangay	8121815	7	1160259	3.439	0.002
If household has been a member of a community organisation	1799114	1	1799114	4.752	0.030

Table 13.7: Total number of trees households intend plant by households by various socioeconomic variables

Socioeconomic variable	Category	N	Mean number of trees	Standard deviation
Whether have own transport?	No	167	143	463.1
	Yes	36	372	1064.9
	All respondents	203	183	616.8
Interested in commercial tree	No	78	48	138.5
	Yes	123	272	773.1
	All respondents	201	185	619.6
Whether household has been a member of a community organisation	No	98	89	510.3
	Yes	102	279	701.5
	All respondents	200	186	621.1
Whether intend to plant timber for sale?	No	151	140	603.0
	Yes	51	313	645.3
	All respondents	202	183	616.8
Whether have own land?	No	87	87	271.1
	Yes	116	256	775.3
	All respondents	203	183	616.8

Table 13.8: Number of trees that households' intend to establish by perception of the most important ecological problem facing the barangay

Ecological problem	N	Mean no. of trees	Standard Deviation
Reforestation needed	43	191	674.4
Flooding from over-clearing	40	83	153.8
Illegal logging	34	114	374.8
Degradation of the natural forest	17	57	147.1
Soil degradation or loss	22	737	1283.3
Kaingin	5	90	99.5
None	15	37	63.2
Loss of available water due to clearing	9	40	54.9
Total	185	183	607.2

Finally, the total and average distance to the farming parcels of the household are both positively correlated with the number of trees that households plan to establish, suggesting that tree planting is perceived as a potential activity for farming parcels that are more distant from the household (Table 13.9).

Table 13.9: Correlations between 'Total number of trees intended to plant' and continuous socioeconomic variables

Variable	Pearson Correlation	Sig. (2-tailed)	N
Household gross yearly income	0.191	0.006	203
Average income of each household member	0.202	0.004	203
Proportion of farm land owned	0.142	0.045	201
Total distance to farm plots	0.300	0.000	203
Average distance to farm plots	0.267	0.000	196

13.2 RELATIONSHIPS BETWEEN 'INTEND TO PLANT FOR TIMBER' AND SOCIOECONOMIC VARIABLES

Overall approximately 25% of households indicated that they would plant trees for timber on their land. The strongest relationships with socio-economic variables were with the size of the land managed by the household, the income of the household, involvement in community organisations, other variables that are indicators of higher levels of well-being such as ownership of transport, and current active tree management (Tables 13.10 to 13.14). These relationships are described in the following section.

Table 13.10: Intend to plant for timber by categorical socio economic variables

Variable	d.f.	Chi Square	Probability
Interest in commercial tree farming	1	26.904	0.000
Whether ever household been a member of a community organisation	1	4.512	0.034
Whether presently manage trees	1	13.534	0.000

Table 13.11: Proportion of households intending to plant trees for timber by various socioeconomic variables

		Intend to plant trees for timber		
Socioeconomic variable	Category	No (%)	Yes (%)	All respondents (%)
Interested in commercial tree farming	No	62	25	39
	Yes	38	75	61
	Total	100	100	100
Whether ever been member of a community organization	No	59	43	49
	Yes	41	57	51
	Total	100	100	100
Whether household presently manages trees	No	34	13	21
	Yes	66	87	79
	Total	100	100	100

The area of land managed by the household is related to the intention to plant trees to produce timber, as represented by several variables including the size of the land owned by the household, their total land size and the number of farming parcels they operate (Tables 13.12 and 13.13). The household gross yearly cash income is also related to the intention to produce timber from future plantings, but is only significant at the 10% confidence level.

Table 13.12: One way ANOVA tests between 'intend to plant for timber' and socioeconomic variables

Variable	Sum of Squares	df	Mean Square	F	Sig.
Number of farming plots used	14.6	1	14.65	15.35	0.000
Number of species of future plantings to be harvested for timber	63.6	1	63.56	77.69	0.000
Total trees intended to plant	3617042.8	1	3617042.83	9.93	0.002
Own land size	0.9	1	0.87	4.53	0.036
Total distance to farm plots	101.1	1	101.07	3.41	0.066
Size of all household land	55.2	1	55.19	3.17	0.076
Ratio of labour to land area managed	0.8	1	0.82	3.02	0.084
Number of children under 12 not at school	2.8	1	2.82	2.86	0.093
Household gross yearly income	8063793485.6	1	8063793485.64	2.74	0.099

The total distance to all farming parcels operated by the household is significantly higher for those households intending to plant trees for timber production. This variable is highly correlated with the number of farming plots operated and the size of the households land. The number of children at school and not at school was also important, with those households with greater numbers of children not at school more likely to be intending to plant trees for timber (Table 13.13). The ratio of working adults to children is lower for those planning to plant trees for timber production. These results, together with those relating to the distance to the farming plots (Tables 13.13 and 13.16), suggest that households planting trees to produce timber may see tree planting as a possible means to save labour for their land management activities.

Table 13.13: If intend to plant for timber by various socioeconomic variables

Variable	Intend to plant for timber	N	Mean	Standard deviation
Total trees intended to plant	No	76	10.89	54.88
	Yes	127	286.71	761.25
	All respondents	203	183.45	616.84
Household gross yearly cash income (Pesos)	No	76	43348.12	38648.02
	Yes	127	56371.06	61656.69
	All respondents	203	51495.48	54458.81
Number of children under 12 not at school	No	71	0.56	0.82
	Yes	119	0.82	1.08
	All respondents	190	0.72	1.00
Area of all household land (ha)	No	76	2.14	2.15
	Yes	127	3.21	5.00
	All respondents	203	2.81	4.19
Number of farming plots used	No	76	1.54	0.82
	Yes	127	2.09	1.06
	All respondents	203	1.89	1.01
Total distance to farm plots (km)	No	76	2.33	3.07
	Yes	127	3.78	6.46
	All respondents	203	3.24	5.48
Own land size (ha)	No	38	0.95	1.61
	Yes	74	1.73	4.06
	All respondents	112	0.18	3.38
Ratio of labour to land size (Labour/ha)	No	70	7.05	14.03
	Yes	124	6.28	25.23
	All respondents	194	6.56	21.82
Number of species of future plantings to be harvested for timber	No	18	0.00	0.00
	Yes	127	2.01	0.96
	All respondents	145	1.76	1.12

Tests of the number of trees that the households intend to establish to produce timber indicate that those households who have an interest in commercial tree farming, have their own land, belong to a community organization and own their own transport intend to plant a greater number of trees for timber production than those households that do not have these characteristics (Tables 13.14 and 13.15).

Table 13.14: One-way ANOVA tests showing significant relationships between the number of trees households intend to harvest for timber from future plantings and various socioeconomic characteristics

Variable	Sum of Squares	df	Mean Square	F	Sig.
Most urgent ecological problem in the barangay	8447199	7	1206743	4.516685	0.000
Interest in commercial tree farming	2199558	1	2199558	7.000	0.009
Whether have own transport	1570317	1	1570317	4.993603	0.027
Whether ever been a member of a community organisation	1242707	1	1242707	3.877481	0.050
Whether have own land	1078648	1	1078648	3.404	0.067

Table 13.15: Number of trees households intend to harvest from future plantings for timber by various socioeconomic variables

Variable	Category	N	Mean no. of trees	Standard deviation
Interested in commercial tree farming	No	78	30	89.0
	Yes	123	244	712.4
	Total	201	161	568.9
Whether have own land	No	87	75	267.9
	Yes	116	223	707.3
	Total	203	160	566.3
Whether been a member of a community organisation	No	98	82	508.4
	Yes	102	239	616.5
	Total	200	162	570.2
Whether have own transport	No	167	119	377.8
	Yes	36	349	1062.6
	Total	203	160	566.3

Table 13.16: Correlations between the number of trees households intend to harvest for timber from future plantings and continuous variables

	Correlation	Sig. (2-tailed)	N
Average income of each household member	0.231	0.001	203
Household gross yearly income	0.219	0.002	203
Average distance to farm plots	0.211	0.003	196
Total distance to farm plots	0.203	0.004	203
Proportion of farm land owned	0.141	0.045	201

13.3 RELATIONSHIPS BETWEEN 'INTEREST IN COMMERCIAL TREE FARMING' AND SOCIOECONOMIC VARIABLES

Another indicator of households tree planting intentions included in the household survey was a question that asked if the household has an interest in commercial tree farming. Approximately 60% of respondents indicated an interest in commercial tree farming, with no significant differences between communities, although the proportions of interested households varied considerably between some. In Poting Bato only half of the households were interested compared to more than two thirds of those at Rizal II. The variables with the strongest relationship with interest in tree farming include past and present uses of resources from public lands, plus involvement with community organisations and community forestry programs (Table 13.17).

Table 13.17: Interest in commercial tree farming by categorical socioeconomic variables

Variable	d.f.	Pearsons Chi Square	Probability
Used resources from public land in the past	1	16.317	0.000
If ever been member of a community organisation	1	12.177	0.000
Intend to plant trees for timber	1	30.164	0.000
Intend to plant trees	1	47.841	0.000
If use materials from public lands	1	10.187	0.001
If participated in community forestry program	1	9.065	0.003
Presently growing timber for sale	1	7.761	0.005
Know how to register trees	1	5.647	0.017
Highest education category	2	6.752	0.034
Cropping types	5	10.404	0.065
If household member has done any community forestry training	1	2.992	0.084

Interest in tree farming was strongly related to the landholding of the household, in particular to the ownership of land by the household and the control of more than one farming plot (Table 13.18). Involvement with community organisations was once more related to interest in commercial tree farming. In terms of the highest level of formal education in the household, those with high school education were significantly more interested in commercial tree farming (70%) than those with elementary or collage education (50%).

Table 13.18: Proportion of households interested in commercial tree farming by various socioeconomic variables

		Interest in commercial tree farming		
Socioeconomic variable	category	No (%)	Yes (%)	Total (%)
Used resources from public land in the past	No (%)	51	49	100
	Yes (%)	22	78	100
	All respondents (%)	40	60	100
If ever been member of a community organisation	No (%)	51	49	100
	Yes (%)	26	74	100
	All respondents (%)	38	62	100
Intend to plant trees for timber	No (%)	50	50	100
	Yes (%)	6	94	100
	All respondents (%)	39	61	100
Intend to plant trees	No (%)	82	18	100
	Yes (%)	26	74	100
	All respondents (%)	39	61	100
If use materials from public lands	No (%)	45	55	100
	Yes (%)	20	80	100
	All respondents (%)	38	62	100
If participated in a community forestry program	No (%)	47	53	100
	Yes (%)	25	75	100
	All respondents (%)	39	61	100
Presently growing timber for sale	No (%)	42	58	100
	Yes (%)	10	90	100
	All respondents (%)	39	61	100
Know how to register trees	No (%)	41	59	100
	Yes (%)	19	81	100
	All respondents (%)	37	63	100
If household has done any community forestry training	No (%)	43	57	100
	Yes (%)	30	70	100
	All respondents (%)	39	61	100

The households with an interest in commercial tree farming differed from those with no interest in terms of the proportion and size of land owned by the household, the total and average distance to their farming plots, and the number of trees they are presently growing that they plan to sell (Table 13.19). Those with an interest in commercial tree farming tend to own significantly more land and a greater proportion of the land they manage. They also tend to manage land that is further away from their households' location, and to control a greater number of farming plots than those with no interest in commercial tree farming (Table 13.20).

Table 13.19: One way ANOVA tests between 'interest in commercial tree farming' by socio-economic variables

Variable	Sum of Squares	df	Mean Square	F	Sig.
Total distance to farm plots	1.283083	1	1.283	5.077	0.025
Proportion of farm land owned	0.802115	1	0.802	4.198	0.042
Number of farming plots used	4.15021	1	4.150	4.125	0.044
Average distance to farm plots	0.863908	1	0.864	4.028	0.046
Size of owned land	0.571729	1	0.572	3.096	0.081
Number of trees planned to be sold	1.444308	1	1.444	3.924	0.088

Table 13.20: Mean values for variables significantly different between those with and without an interest in commercial tree farming

Variable	Interest in commercial tree farming	N	Mean	Std. Deviation
Proportion of farm land owned (%)	Yes	121	47	.454
	No	78	34	.409
	Total	199	42	.441
Number of farming plots used	Yes	123	2.00	1.03
	No	78	1.71	.95
	Total	201	1.89	1.01
Total distance to farm plots (km)	Yes	123	3.74	5.19
	No	78	2.43	5.89
	Total	201	3.23	5.49
Average distance to farm plots (km)	Yes	122	1.89	2.40
	No	72	1.34	3.02
	Total	194	1.69	2.65
Number of trees planned to be sold	Yes	123	62.80	365.99
	No	78	.32	2.83
	Total	201	38.56	287.48
Area of Land owned by the household (ha)	Yes	123	1.75	4.14
	No	78	.95	1.52
	Total	201	1.44	3.39

13.4 RELATIONSHIPS BETWEEN 'INTENTIONS TO PLANT TREES TO PRODUCE TIMBER FOR SALE' AND SOCIOECONOMIC VARIABLES

The 51 households who intend to plant trees to produce timber for sale intend to plant an average of 229 trees per household, while the average number of trees that the 159 households intend to plant for any reason is 234. Four households that indicated that they intend to plant more than 2000 trees that are timber species but indicated that they were for household use only.

Testing between socioeconomic variables and variables indicating the households' intention to plant trees to produce timber for sale revealed many significant relationships (Tables 13.21 to 13.25). In this case the size of the land managed by the household was not significant, but the level of household cash income is significant, as are a number of other variables that were significantly related to households' intention to produce timber for their own consumption (Table 13.25).

Table 13.21: Results of one-way ANOVA tests showing significant relationships between intentions to plant trees to produce timber for sale and categorical variables

Variable	Sum of Squares	df	Mean Square	F	Sig.
Interest in commercial tree farming	726860.6	1	726860.6	4.939	0.027
Most urgent ecological problem in the barangay	4901546	7	700220.8	4.956	0.000

Those households that indicated an interest in commercial tree farming also indicated that they intend to plant a greater number of trees to produce timber for sale than those households which did not indicate an interest in commercial tree farming (Table 13.22).

Table 13.22: Mean number of tree households intend to establish to produce timber for sale by various socioeconomic variables

Variable	Category	N	Mean number of trees	Std. Deviation
Interest in commercial tree farming	No	78	3	15.5
	Yes	123	126	489.8
	Total	201	78	387.4
Most urgent ecological problem in the barangay	Reforestation needed	43	5	30.7
	Flooding from over-clearing	40	41	75.5
	Illegal logging	34	53	308.7
	Degradation of the natural forest	17	0	0.5
	Soil degradation or loss	22	525	1013.3
	Kaingin	5	7	16.1
	None	15	29	52.6
	Loss of available water due to clearing	9	0	0.0
	Total	185	85	403.2

Those households with different opinions about the most critical ecological problem confronting the barangay also differed significantly in terms of the number of trees they intend to plant to produce timber in the future (Tables 13.21 and 13.22). Concern about soil loss and degradation, illegal logging and flooding from overclearing were most strongly related to higher intended tree planting activity.

A number of socioeconomic variables indicating previous experience in the forestry industry are significantly related to the intention to plant trees to produce timber for sale. These include the use of materials from public lands, participation in community organisations and community forestry programs, and the present management of trees to produce timber for sale (Tables 13.23 and 13.24).

Table 13.23: Relationships between intentions to plant trees to produce timber for sale and categorical variables

Variable	Pearsons	df	Sig. (2-sided)
Use materials from public land	13.844	1	0.000
Interest in commercial tree farming	31.195	1	0.000
If ever household been a member of a community organisation	12.720	1	0.000
If presently growing timber for sale	13.766	1	0.000
If ever participated in community forestry project?	11.221	1	0.001
Family always lived in barangay	8.238	1	0.004
Ecological problems in the barangay recoded	16.108	7	0.024
Used public land resources in past	4.361	1	0.037
If have own land	4.171	1	0.041
If any household member has done training	3.923	1	0.048
Community	7.407	3	0.060
Community development needs	14.539	8	0.069
Family remit money	3.284	1	0.070
Know how to register trees	3.212	1	0.073
Household categories	6.314	3	0.097

Those households whose families have always lived in the barangay are more likely to be planning to establish trees to produce timber for sale than those who families have moved to the area, as are those households that own at least part of their farming land, and those households who receive remittances. Interestingly, the participation of households in some form of training, not necessarily related to forestry, is negatively related to the intention to plant trees to produce timber for sale (Tables 13.24). The number of trees the household plans to establish for sale is positively related to the level of cash and land resources managed by the household (Table 13.25)

Table 13.24: Proportions of households that intend to plant trees that will be sold for timber and those that do not by various socioeconomic variables

		Intend to plant trees to produce timber		
Socioeconomic variable	Category	No (%)	Yes (%)	Total (%)
Community	Conalum	65	35)	100
	Puting bato	86	14	100
	Rizal II	68	32	100
	Tigbao	78	22	100
		74	26	100
Household age categories	Young	84	16	100
	Part young	69	31	100
	Semi mature	70	30	100
	Mature	64	36	100
		74	26	100
If any household member has done training	No	68	32	100
	Yes	80	20	100
		74	26	100
Family always lived in barangay	No	92	8	100
	Yes	70	30	100
		74	26	100
Family remit money	No	79	21	100
	Yes	68	33	100
		74	26	100
Use materials from public land	No	82	18	100
	Yes	56	44	100
		75	25	100
Used public land resources in past	No	80	20	100
	Yes	67	33	100
		75	25	100
Know how to register trees	No	76	24	100
	Yes	61	39	100
		73	27	100
Interest in commercial tree farming	No	96	4	100
	Yes	61	39	100
		75	25	100
If ever household been a member of a community organisation	No	86	14	100
	Yes	64	36	100
	Total	75	25	100
If ever participated in community forestry project?	No	84	16	100
	Yes	63	37	100
	Total	76	24	100
If have own land	No	82	18	100
	Yes	69	31	100
	Total	74	26	100
If presently growing timber for sale	No	78	22	100
	Yes	40	60	100
	Total	74	26	100

Table 13.25: Correlations between the number of trees intended to harvest for timber for sale and continuous variables

Variable	Correlation	Sig. (2-tailed)	N
Household gross yearly income	0.162	0.021	203
Average income of each household member	0.156	0.026	203
Proportion of farm land owned	0.121	0.086	201

13.5 SUMMARY OF RELATIONSHIPS BETWEEN TREE PLANTING AND MANAGEMENT INTENTIONS AND SOCIOECONOMIC VARIABLES

The intention to plant trees is a common trait among the households in the communities surveyed, with 75% of respondents indicating they would plant at least one tree in the future. Many of the household characteristics that differed between households presently managing trees and those who are not are also different between households that intend to plant trees in the future and those that do not. The households intentions to plant trees in the future is related most strongly to variables indicative of the level of resources controlled by the household, their experience in forestry activities, and the characteristics of their farming practices (Tables 13.26 to 13.29).

Table 13.26: Summary of interactions between variables relating to intended tree planting behaviour and continuous variables

Variable	Intended no. of trees to be planted	Intended no. of trees to be harvested for timber from future plantings	Intended no. of trees to be harvested for timber for sale from future plantings
Total household income		+	+
Land size	+		
Trees presently managing	+		
Number of farming plots used	+		
Total distance to plots	+	+	
Average distance to plot	+	+	
Average income per household member		+	+
Proportion of farm land owned		+	+
Size of own land	+		
Constraint scale - financial viability	-		
Reason for planting scale – long term	+		

Note: '+' and '-' indicate the direction of the correlation found between the variables

In summary those who intend to plant trees in the future have greater levels of household wealth in terms of access to and ownership of land, higher levels of income, higher levels of education in the house, and include most of those who are presently managing trees on their lands. They are also more likely to have experience in forestry activities, having participated in community forestry programs, and, or, having used materials from public land areas in the past, or be continuing to do so now.

Table 13.27: Summary of one way ANOVA tests between the variables ‘total number of trees intended to grow’, ‘total number of trees intended to grow for timber’ and socioeconomic variables

Variable	Total number of trees intended to grow	Total number of trees intended to grow for timber
Intend to plant trees	*	
Presently growing timber for sale	*	
If have own land	*	*
If ever been member of a community	*	*
Intend to plant for timber	*	
If have own transport	*	*
Interested in commercial tree farming	*	*
Ecological problems in the barangay		*

Note: ‘*’ indicates a significant relationship was found between the variables

Table 13.28: Summary of one way ANOVA tests between the variables ‘intend to plant trees’, ‘intend to plant for timber’ and socio-economic variables

Variable	Intend to plant trees	Intend to grow timber
Number of children below 12 not at school		*
Proportion of farm land owned	*	
Ratio of labour to land size		*
Total distance to farm plots		*
Number of farming plots	*	*
Total trees intended to plant		*
Total trees presently managed or managed	*	
Household gross yearly cash income	*	*
Size of all household land	*	*
Size of owned land	*	*

Note: ‘*’ indicates a significant relationship was found between the variables

In terms of intentions to plant trees the level of household resources is important, with household income and the total land size of the household positively related to the intention to plant trees and the number of trees intended to be planted Another indication of the importance of the level of resources controlled by the household is that the size of the farming land owned by households, together with the proportion of land owned by the household which they use for farming, are related to higher levels of intended tree planting activity. This could also be related to the households' confidence in their security of tenure and thus their ability to control the use of the land over the time taken for the trees to mature.

Table 13.29: Categorical socioeconomic variables with significant relationships to variables indicating intended tree planting and management behaviour

Variable	Intend to plant trees	Intend to plant for timber	Intend to plant for timber for sale
Cropping types	*		
Community development priorities			*
Number of farming plots used	*		
If have own land	*		*
If ever been member of a community	*	*	*
Community	*		*
Highest education category	*		
Intend to plant for timber	*		
Interested in commercial tree farming	*	*	*
If ever participated in a community forestry			*
Used resources from public land in the past			*
If presently growing timber for sale	*		*
If presently managing trees	*	*	
Household age categories			*
Tree planting categories	*		
Proportion of staple food grown	*		
Ecological problems in the barangay			*
If use materials from public lands			*
If know how to register trees			*
If households receives remittances			*
If family has always lived in barangay			*

Note: '*' indicates a significant relationship was found between the variables

Several variables related to the degree of experience of the household in forestry activities are related to households' intentions to plant trees in the future, in particular their intentions to produce timber. The constraint scale 'financial viability issues' was negatively related, indicating that those intending to plant trees for timber are more confident about their ability to produce income than those who do not intend to plant trees in the future. The present and past use of materials from public lands is positively related to intentions to produce timber, as is participation in community forestry programs, the present growing of timber for sale, and knowledge about tree registration regulations.

In terms of the interactions between the type of farming systems used by households and their tree planting and management intentions, several observations can be made. Those that presently grow only vegetables, or coconuts and vegetables reported the greatest interest in planting trees in the future. As for the present management of trees, the distance of the farming plots and the availability of labour were related to tree planting and management intentions of households, with tree planting possibly seen as a way to reduce the labour demands of the land management activities of the household. It is also possible that planting trees is viewed as a means of substantiating claims over land that are remote from the household.

Chapter 14

A TYPOLOGY OF RURAL HOUSEHOLDS IN LEYTE PROVINCE IN RELATION TO THEIR FORESTRY ATTITUDES AND PRACTICES

The univariate analyses presented in the previous six chapters have demonstrated that substantial variation exists in the socioeconomic characteristics and tree management behaviour of households in the communities involved in the survey. These analyses have also demonstrated that complex relationships exist between households' socioeconomic characteristics, their attitudes to forestry activities, and their tree management behaviour and intentions.

As described in Chapters 3 and 4, typologies of households can be used to describe and interpret the variation between households and analyse the manner in which the factors interrelate to produce variations in forestry activity. Previous research projects that have defined typologies of landholders in relation to forestry have all used the variations in landholders' objectives for and constraints to forest management as the criteria for defining types. This previous research has all been undertaken in 'developed' countries, with the literature review revealing that no typologies of landholders in relation to forestry that have been described for 'developing' countries. These studies have all used cluster analysis of ratings of importance for various potential reasons for and, in some cases, constraints to tree planting and management, as the method to define the typologies.

This chapter reports results of cluster analyses that were used to define groups of households with similar attitudes to forestry and the results of tests for socioeconomic differences between the groups. The socioeconomic characteristics of the groups were then assessed to develop a typology of households, and to determine the practical utility and predictive validity of the typology. In the first section of the chapter the cluster analysis procedures are detailed, and the resulting groups or types of households are described in section 2. In the third section the socioeconomic characteristics of the various types are described using the results of analyses of variations in these characteristics. The predictive validity of the results is discussed in the fourth section, and a summary of the analyses and interpretation is presented in the final section of this chapter.

14.1 METHODOLOGY USED TO DEFINE A TYPOLOGY OF HOUSEHOLDS IN RELATION TO FORESTRY

The criteria used to define the typology in this thesis were households' scores on scales of the ratings of importance for various reasons for and constraints to tree planting and management. In other words, cluster analysis was applied to responses to questions in the household surveys that asked households to rate the importance of various reasons for and constraints to tree planing and management as inputs to the analysis. The criteria used in the cluster analyses are the six scales that were computed following factor analysis of households' ratings of importance for various reasons for and constraints to tree planing and management as reported in Chapter 10.

The decision to use the attitude scales as inputs to the cluster analysis was based on the comparison of the findings from analyses of the relationships between the scales and the socioeconomic characteristics of the households with the findings of analysis of relationships between households' socioeconomic characteristics and their tree management behaviour and intentions. The comparison revealed that a households rating of importance to the various scales has numerous relationships with both a households' socioeconomic characteristics, and their present an intended tree management behaviour (Tables 14.1 and 14.2).

Table 14.1. Relationships between households socioeconomic characteristics, tree management behaviour and intentions, and households scores on scales of reasons for tree management

Socioeconomic variables	Immediate	Long-term
Proportion of staple food produced	*	*
Proportion of total food produced	*	*
House construction materials		*
Use materials from public lands	*	*
Use materials from public lands in the past	*	*
If have been member of a community organisation	*	
If below poverty line	*	
Remittance amount average per year	-	-
Tree planting density	+	
Proportion of household land with moderate to steep slope	-	
Number of trees intended to plant		+

Note: the symbol '*' indicates tests for relationships significant at the 0.05 confidence level, '+' indicates a positive correlation between variables, '-' indicates a negative correlation between the variables

It was thus concluded that the scales are sufficiently representative of the variations between households and sufficiently related to the households' socioeconomic characteristics and their tree management behaviour and intentions to warrant their use as criteria to create the typology. The scales were used rather than the ratings of importance for individual items in each scale so as to avoid potential problems of multicollinearity between ratings on individual items. This multicollinearity could bias the results of the cluster analysis through exaggerating the importance of factors represented by scales with a large number of items (Hair et al. 1998).

Table 14.2. Relationships between households socioeconomic characteristics, tree management behaviour and intentions, and households scores on scales of constraints to tree management

Socioeconomic variables	Tree protection	Planting support	Financial viability	Tenure and space
Communities	*		*	*
Social variables				
Number of people in the household			-	
Ratio of working adults to children		+		
If have been member of a community organisation		*		*
If have participated in community forestry project				*
Time family lived in barangay		+	+	
Household resource variables				
Total household cash income	-			
Proportion of income from farming		+		
If own some portion of farming land	*	*	*	*
Proportion of farm land owned	-	-	-	-
If own some portion of farming land suitable for growing rice			*	*
Size of all household land			-	-
Size of owned land			-	-
Size of household land with moderate to steep slope		-		-
Proportion of household land with moderate to steep slope		-		
Farming system variables				
Total distance to farm plots	-	-	-	-
Average distance to farm plots	-	-	-	-
Number of farming plots used				-
Proportion of total food produced			*	*
Tree planting and management variables				
Tree planting density	+			+
Intended number of tree to be sold for timber		-		
Number of trees intended to plant			-	
If know how to register trees	*			
Use materials from public lands	*		*	
Use materials from public lands in the past	*			*

Note: the symbol '*' indicates a significant relationship was identified between the ratings of importance for the scale and a categorical variable. The symbols '+' and '-' indicate a significant positive and negative correlation between ratings of importance for the scale and a continuous variable.

A number of stages involving various cluster analysis methods and assessment of results of these analyses were followed in order to define the household groups that became the basis of the typology of households. These stages are illustrated in Figure 14.1.

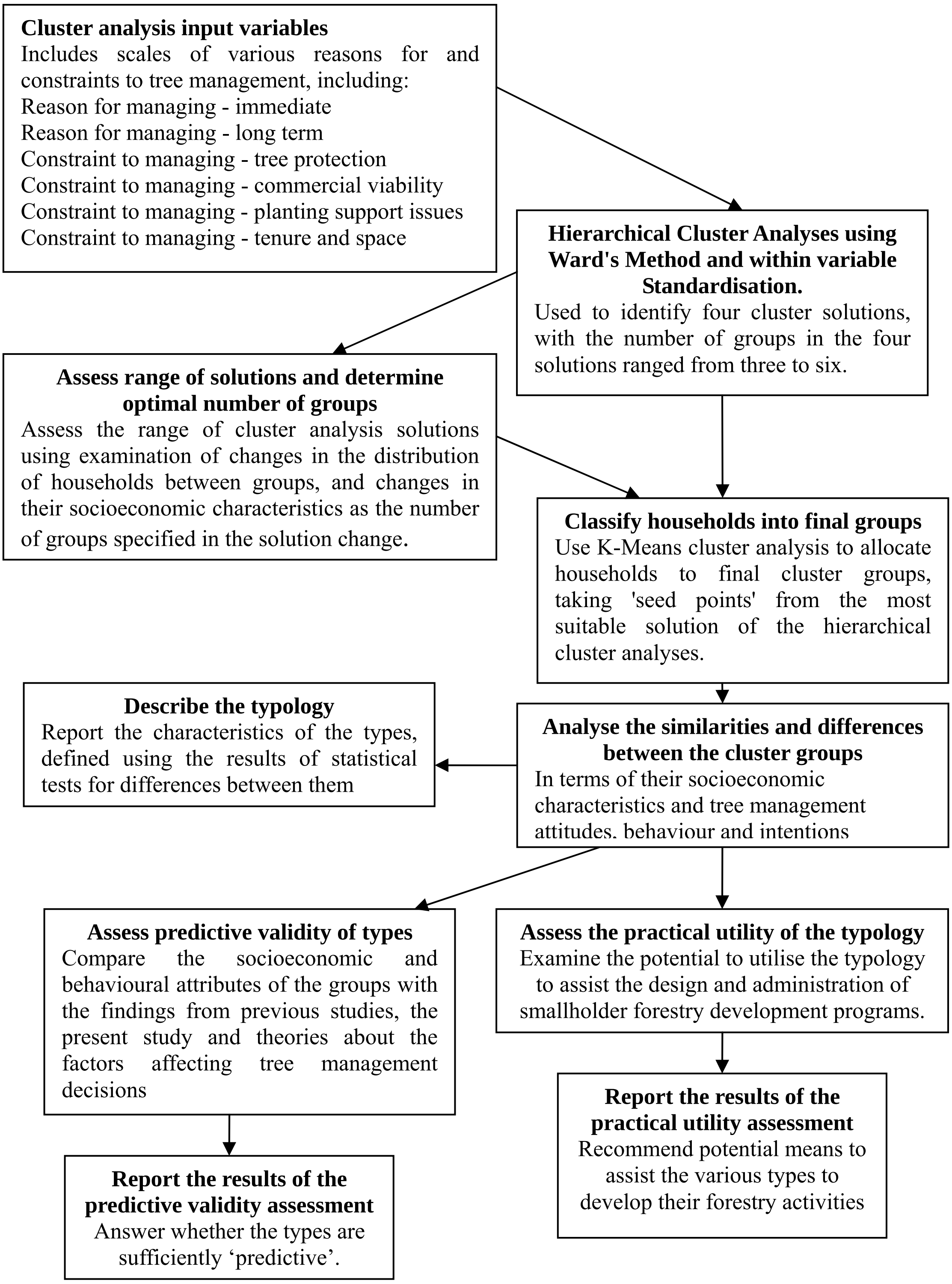

Figure 14.1. Stages of the methodology used to define a typology of rural households in Leyte

Initially, hierarchical cluster analysis using Ward's Method was used to identify the optimal number of clusters. The optimal cluster solution was determined as that which maximises the internal homogeneity and external heterogeneity of the groups, and has an even spread of households. The advantage of using the Ward method of hierarchical cluster analysis as opposed to other hierarchical methods is that it tends to form groups with similar sizes (Hair et al. 1998), thereby assisting later tests of differences between the groups using univariate and multivariate statistical procedures.

Response style bias can greatly affect hierarchical cluster analyses applied to attitudinal variables, as some respondents tend to rate every factor very highly or lowly. Within case standardisation (using z scores) was used in the hierarchical analyses to address the possibility of response style bias affecting the procedure (Hair et al. 1998). Within case standardisation emphasises the relative importance of the responses within each case. Between case standardisation was unnecessary as the scales used as criteria are all in the same unit of measurement.

A range of possible solutions (in terms of the number of groups created, from three to six) was examined to assess how the number of households in each group varied as the number of groups increased (Table 14.3). It can be seen that when three groups are formed they are very uneven in size, with group 1 being four times the size of group 3. When four groups are formed, group number 2 of the three groups' solution is split to form groups 2 and 3. When five groups are formed, group 1 of the four and three groups' solutions is split to form groups 1 and 2.

Table 14.3: Comparison of the number of members in each group in various solutions using Wards method of cluster analysis

Group number	6 groups	5 groups	4 groups	3 groups
1	48	48	102	102
2	29	54	41	68
3	25	41	27	25
4	41	27	25	
5	27	25		
6	25			

A comparison was made of the socioeconomic differences between groups defined by the initial hierarchical cluster analysis and the subsequent k-means cluster analysis and with different numbers of groups in the solution (Table 14.4). This analysis revealed that there was a large number of statistically significant socioeconomic differences in common between the groups, that are stable between methods and the number of groups defined.

Table 14.4. Summary of the results of tests for socioeconomic differences between groups defined by various cluster analysis methods

Variable	Wards 4 groups	Wards 5 groups	K-means 4 groups	K-means 5 groups
If ever been a member of a community org.		**	**	**
If have own land	**	**	**	**
If planted trees	**	**	*	
Intend to plant trees	**	**	**	**
If intend to plant for timber	**	**	**	**
If household below regional poverty t.hold		*	**	*
Ecological problems in the barangay	**	**	**	**
If participated in a comm. forestry program				*
If participated in agriculture training				*
If ever been a member of a community org.		**	**	**
If have own land	**	**	**	**
If planted trees	**	**	*	
Intend to plant trees	**	**	**	**
If intend to plant for timber	**	**	**	**
If household below regional poverty t.hold		*	**	*
Ecological problems in the barangay	**	**	**	**
If participated in a comm. forestry program				*
If participated in agriculture training				*
Community	**	**	**	**
Percent of staple food grown		*		
Percent of total food grown	**	**	**	**
House construction materials			**	**
Lease contract	*	**	**	**
Use materials from public land	**	**	**	**
Used public land resources in past	**	**	**	**
Reason stopped using public land resources	*	**	**	**
Know how to register trees			**	*
Interest in commercial tree farming	**	**	**	**
Total hse income			**	
Average income per member				
Proportion of income from farming		*	**	**
Remittance amount		**	**	**
Livestock income	*			
Total distance to farm plots	**	**	*	*
Average distance to farm plots	*			
Whether trees presently managed				
Whether intend to plant trees	**	**	**	**
Tree planting intensity	**	**		*

'**' indicates relationships significant at the 0.05 confidence level, and '*' indicates tests for relationships significant at the 0.1 confidence level using ANOVA tests and tests for multiple differences in the means

Comparison of the cluster solutions in Table 14.4 revealed that the socioeconomic differences between groups in the solutions were largely the same irrespective of the cluster solution or method. As a consequence of this analysis, it was therefore decided to use the five group K-means analysis solution, as this has the most even group sizes, an important consideration for reliable testing of differences between the groups.

The centroids or mean values of the scales relating to the importance of various reasons for and constraints to tree planting and management were then calculated and used as ‘seed points’ for a non-hierarchical (or K-means) cluster analysis to form the final cluster group membership results (Table 14.5). The results of the K-means cluster analysis and the characteristics of the groups defined are described in the following section.

Table 14.5: Cluster seed points used for the K-means cluster analysis

	Cluster Group				
	1	2	3	4	5
Constraint to managing - tree protection	1.90	2.39	2.13	3.13	1.69
Constraint to managing - planting support	1.81	3.65	1.80	3.69	3.04
Constraint to managing - financial viability	2.11	2.18	2.45	3.56	3.47
Constraint to managing - space and tenure	1.76	2.96	4.04	4.59	1.91
Reason for managing - immediate	4.30	4.01	4.37	3.63	3.19
Reason for managing - long term	4.81	4.54	4.45	4.05	3.94

Each cluster group includes between 13% and 24% of the sample, with nine cases that were not included in any group due to missing data. The number of households in each group and their proportion of the sample are presented in Table 14.6. The characteristics of the groups are described in the following section.

Table 14.6: Number and proportion of households in each cluster group

Cluster group	Frequency	Proportion (%)
1	43	22
2	25	13
3	45	23
4	47	24
5	35	18
Valid observations	195	
Missing observations	9	

14.2 VARIATIONS IN ATTITUDES TO TREE PLANTING AND MANAGEMENT BETWEEN CLUSTER GROUPS

The ratings for scales measuring the importance of constraints to tree management show the greatest variation between the groups, as illustrated in Table 14.7 and Figures 14.2 and 14.3. The ratings range from those of Cluster Group 1, who place the lowest importance on all scales relating to constraints and high importance on scales of various reasons for tree planting and management, to those of Cluster Group 4 who have the highest ratings for every scale.

Table 14.7: Final mean scores for scales of reasons for and constraints to tree management of groups defined by K-means cluster analysis

Scale of attitude to tree managment	Cluster Group				
	1	2	3	4	5
Constraint to managing - tree protection	1.18	2.37	1.76	3.95	1.69
Constraint to managing – planting support	1.63	3.65	1.86	4.02	2.83
Constraint to managing - commercial viability	1.35	2.35	2.01	3.88	3.21
Constraint to managing – tenure and space	1.40	2.11	3.97	4.49	2.26
Reason for managing - immediate	4.17	4.39	4.14	4.46	2.70
Reason for managing - long term	4.65	4.67	4.49	4.69	3.62

Note: scores indicate average ratings of importance for the items included in each scale. Scores for each item range from 1 = not important, 5 = very important.

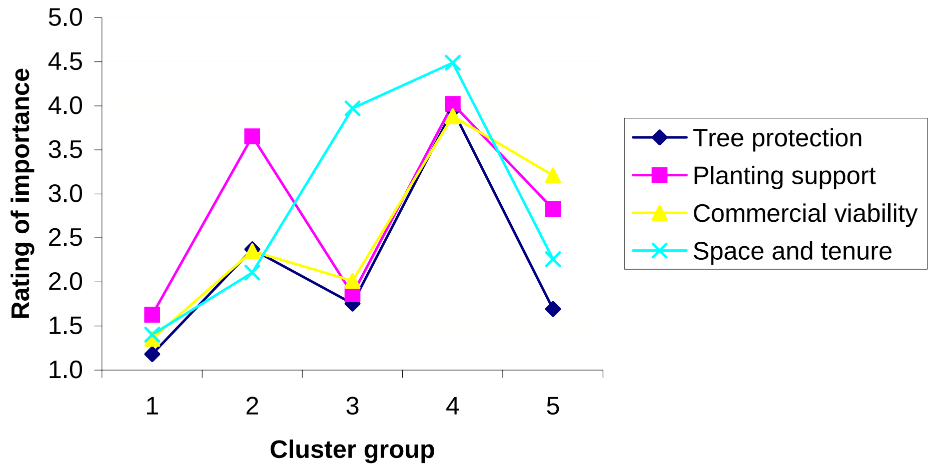

Figure 14.2: Mean ratings of importance of scales relating to constraints to tree planting and management by groups clustered according to those ratings.

Note: Scores indicate average ratings of importance for the items included in each scale. Scores for each item range from 1 = not important, 5 = very important

Figure 14.3: Mean ratings of importance of scales relating to reasons for tree planting and management by groups clustered according to those ratings

Note: Scores indicate average ratings of importance for the items included in each scale. Scores range from 1 = not important, 5 = very important

The clustering of the households works to maximise the differences between groups and minimise within group variation, and thus it is to be expected that there are differences between the cluster groups in terms of their attitudes (Table 14.8).

Table 14.8. Results of one-way ANOVA tests for differences in ratings of importance for various scales of reasons for and constraints to tree management by cluster groups

Scale of attitude to tree management		Sum of Squares	df	Mean Square	F	Sig.
Constraint to managing - tree protection	Between Groups	207.49	4	51.87	76.72	0.000
Constraint to managing – planting support	Between Groups	186.07	4	46.52	72.48	0.000
Constraint to managing - commercial viability	Between Groups	173.35	4	43.34	61.19	0.000
Constraint to managing – tenure and space	Between Groups	295.49	4	73.87	134.95	0.000
Reason for managing - immediate	Between Groups	75.02	4	18.75	40.74	0.000
Reason for managing - long term	Between Groups	29.69	4	7.42	20.18	0.000

One-way ANOVA tests for differences in the ratings of importance for the various scales of potential reasons for and constraints to tree management are significant for all the scales. High F scores for a scale from one–way ANOVA tests for differences between the cluster groups indicate that those scales are more important in the clustering process (SPSS 2000). The F score for the scale 'constraint to managing – tenure and space' at 134.95 is the highest F score of all the scales, as illustrated in Table 14.8, followed by the scales 'constraint to managing - tree protection', and 'constraint to managing – planting support'. The lowest F score is for the scale 'reason for managing - long term'.

Testing of the homogeneity of variance between the cluster groups for their scores on the scales of attitudes to tree management revealed differences between groups for three of the six scales ($p < 0.05$) (Table 14.9). Differences between the cluster groups in the variance of the scale mean violates the assumptions of many tests for multiple differences in the means between groups applied after finding significant results for one-way ANOVAs. These tests include the Least Significant Difference, Bonferroni and Student-Newman-Keuls tests (Manly 1994, Hair et al. 1998). The Tamhane test does not assume equal variances for groups being tested, and this test is used rather than Student-Newman-Keuls tests for the scales which have a large degree of variance within groups.

Table 14.9: Tests of homogeneity of variances between cluster groups on the scales relating to the importance of various reasons for and constraints to tree planting and management

	Levene Statistic	Degrees of freedom 1	Degrees of freedom 2	Significance
Constraint to planting - tree protection	15.383	4	190	0.000
Constraint to planting - support issues	1.346	4	190	0.255
Constraint to planting - commercial viability	1.994	4	190	0.097
Constraint to planting – tenure and space	5.842	4	190	0.000
Reason for planting immediate	1.195	4	190	0.315
Reason for planting long term	3.262	4	190	0.013

Numerous differences between the cluster groups in terms of their ratings of importance for various scales relating to reasons for and constraints to tree management were revealed through statistical testing using one-way ANOVAs and subsequent testing for multiple differences in the means (Tamhane and Student-Newman-Keuls tests). Results of these tests are illustrated in Tables 14.10 to 14.15.

In terms of ratings of importance for 'tree protection' issues as a constraint to tree planting and management, households in Cluster Group 4 rated this factor higher than other groups, and Cluster Groups 5, 3 and 2 also rated the importance of this factor higher then households in Cluster Group 1.

Table 14.10: Tahmane tests for multiple differences between cluster groups in their ratings of importance for the scale ‘constraint – tree protection issues’

		Scale means		
Cluster group	N	1	2	3
1	43	1.18		
5	35		1.69	
3	45		1.76	
2	25		2.37	
4	47			3.95

Note: the mean scores for the scales that are in the same columns are not significantly different from each other at the 95% confidence level, while those in separate columns are different at that level.

In terms of ratings of importance for ‘planting support’ issues as a constraint to tree planting and management, households in Cluster Group 4 rated this factor higher than other groups. Cluster Group 2 rated the importance of this factor higher then households in Cluster Groups 5, 3 and 1, with the ratings of Cluster Group 5 next highest, and those of cluster groups 1 and 3 lowest (Table 14.11).

Table 14.11: Student-Newman-Keuls tests for multiple differences between cluster groups in their ratings of importance for the scale ‘constraint - planting support issues’

		Scale means			
Cluster group	N	1	2	3	4
1	43	1.63			
3	45	1.86			
5	35		2.83		
2	25			3.65	
4	47				4.02

Note: the mean scores for the scales that are in the same columns are not significantly different from each other at the 95% confidence level, while those in separate columns are different at that level.

In terms of the ratings of importance for the constraint scale of ‘commercial viability’, Cluster Group 4 again gave the highest rating of importance, followed this time by Cluster Group 5, then Cluster Groups 2 and 3, with the ratings of Cluster Group 1 lowest (Table 14.12).

Table 14.12: Student-Newman-Keuls tests for multiple differences between cluster groups in their ratings of importance for the scale ‘constraint – commercial viability’

		Scale means			
Cluster group	N	1	2	3	4
1	43	1.35			
3	45		2.01		
2	25		2.35		
5	35			3.21	
4	47				3.88

Note: the mean scores for the scales that are in the same columns are not significantly different from each other at the 95% confidence level, while those in separate columns are different at that level.

In terms of the ratings of importance for the constraint scale of ‘tenure and space’ issues, Cluster Group 4 once more gave the highest rating of importance, followed by Cluster Group 3, then Cluster Groups 2 and 5, with the ratings of Cluster Group 1 lowest (Table 14.13).

Table 14.13: Tamhane tests for multiple differences between cluster groups in their ratings of importance for the scale ‘constraint – tenure and space issues’

		Scale means			
Cluster group	N	1	2	3	4
1	43	1.40			
2	25		2.11		
5	35		2.26		
3	45			3.97	
4	47				4.49

Note: the mean scores for the scales that are in the same columns are not significantly different from each other at the 95% confidence level, while those in separate columns are different at that level.

As illustrated in Tables 14.7 and 14.8, and Figure 14.2, there is less variation between the cluster groups in terms of their ratings of importance for the two scales relating to reasons for managing trees. One-way ANOVA and post-hoc tests for multiple differences in the mean ratings of the groups revealed that the mean rating of importance for both reasons for tree management scales by households in cluster Group 5 are significantly lower than those of other groups ($p < 0.000$) (Tables 14.14 and 14.15).

Table 14.14: Student-Newman-Keuls tests for multiple differences between cluster groups in their ratings of importance for the scale 'reasons – immediate'

		Scale means	
Cluster group	N	1	2
5	35	2.70	
3	45		4.14
1	43		4.17
2	25		4.39
4	47		4.46

Note: the mean scores for the scales that are in the same columns are not significantly different from each other at the 95% confidence level, while those in separate columns are different at that level.

Table 14.15: Tamhane tests for multiple differences between cluster groups in their ratings of importance for the scale 'reasons – long-term'

		Scale means	
Cluster group	N	1	2
5	35	3.62	
3	45		4.49
1	43		4.65
2	25		4.67
4	47		4.69

Note: the mean scores for the scales that are in the same columns are not significantly different from each other at the 95% confidence level, while those in separate columns are different at that level.

By examining the relative importance placed on differing facets of reasons for and constraints to tree planting and management, together with examining differences in socioeconomic characteristics between the groups, some insight into the reasons behind the ratings can be generated. Each group has a unique combination of scores on the attitude scales, or attitude profile, which, in conjunction with their socioeconomic characteristics helps to explain their capacity and enthusiasm for, and constraints to, forestry development. The differences in attitudes between the groups are discussed in detail in the following section, together with results of tests for differences between the groups in their socioeconomic characteristics.

14.3 VARIATIONS IN THE SOCIOECONOMIC CHARACTERISTICS OF CLUSTER GROUP MEMBERS

In this section, the results of tests for differences in the socioeconomic characteristics of the groups are reported, and the groups are described and interpreted to define a typology of households.

There are a number of significant differences (at the 95% confidence level) between the cluster groups in socioeconomic characteristics. The results of Chi Square and ANOVA tests are presented in Tables 14.16 to 14.18. The characteristics that differ between the groups include the cash income and amount of food grown by the household (proportion of the households in the group below the poverty line and proportion of total food grown by the household); their involvement in community organisations, training activities and community forestry programs; their ownership of land used for farming; their past and present use of public land materials; and their present and intended tree planting and management behaviour.

Table14.16: Chi Square tests between 'cluster groups' and socio economic categorical variables

	Chi value statistic	Degrees of freedom	Significance
Community	35.547	12	0.000
Lease contract	23.776	4	0.000
Use materials from public land	46.34	4	0.000
Used public land resources in past	34.626	4	0.000
Reason stopped using public land resources	47.874	16	0.000
Interest in commercial tree farming	18.056	4	0.001
Percent of total food grown	29.308	12	0.004
House construction materials	22.076	8	0.005
If intend to plant for timber	12.905	4	0.012
Ecological problems in the barangay	47.624	28	0.012
If ever been a member of a community org'n	11.631	4	0.020
Intend to plant trees	10.235	4	0.037
If have own land	9.673	4	0.046
If below regional poverty threshold	8.894	4	0.064
If participated in a community forestry program	8.165	4	0.086
Know how to register trees	7.902	4	0.095
If participated in agriculture training	7.816	4	0.099

Table 14.17: One-way ANOVA tests showing significant differences between cluster groups in terms of various continuous socioeconomic variables

Independent variable	F value	Sig.
Proportion of income from farming	2.691	0.032

Table 14.18. Results of Bonferroni tests for multiple differences in the mean proportion of income gained from farming and fishing

Variable	Cluster group number (I)	(J)	Mean Difference (I-J)	Significance
Proportion of income from farming	4	3	0.20	0.051
Proportion of income from farming	4	5	0.20	0.085

In the following section the socioeconomic characteristics of each of the cluster groups are described in turn, and the groups are named to reflect the characteristics that best describe their situation in relation to tree planting and management. The socioeconomic characteristics of the groups are summarised in Tables 14.19 to 14.21 in the following sections.

14.3.1 Characteristics of Cluster Group 1 – the 'Confident Farmers'

Cluster group 1 households have the highest percentage of members that own at least some of the land that they are farming at 72%, tend to grow a relatively high proportion of their own food, and have relatively large farming areas to manage (Table 14.19). However, they are also cash poor, with almost 75% below the official poverty line, as defined by the Philippines National Statistics Coordination Board (2003). A high percentage of their houses are made of light materials, and the land they do manage is, on average, furthest from their houses of all the cluster groups.

Households in Cluster Group 1 have the greatest interest in developing commercial tree farming. They rated all of the potential constraints to tree planting and management very lowly and all reasons for planting and managing trees highly. Over 60% of these households have been or still are members of a community organisation, and more than 40% have participated in community forestry programs, so they do not appear to be marginalised from the community. Their low level of attendance in agricultural training activities together with the low ratings of importance they place on potential constraints to tree planting and management suggests that they are confident in their own abilities in regards to farming, hence their name 'confident farmers'.

Table 14.19: Profile of cluster groups on various socioeconomic characteristics and tree planting and management behaviour

	Percent of households in each cluster group				
Variable	1 (%)	2 (%)	3 (%)	4 (%)	5 (%)
Households below poverty line	74	64	53	75	51
If own some of the land they farm	72	60	53	40	60
Have a lease contract	24	22	40	16	67
Proportion of total food needed for household produced by the household					
0 - 50%	63	88	71	85	60
51 - 100%	37	12	29	15	40
House construction materials					
Light materials	54	32	27	51	34
Mixed materials	37	36	29	34	46
Concrete	9	32	44	15	20
Intend to plant trees in the future	79	88	69	63	88
Interested in commercial tree farming	77	72	44	46	74
If participated in community forestry project	42	42	35	27	57
If know how to register trees	19	29	17	5	21
Have belonged to a community organisation	61	56	52	32	66
If attended agricultural training	12	36	20	32	29
If use resources from public lands	19	8	23	18	74
If use resources from public lands in the past	40	16	30	27	80

Table 14.20: Percentage of each cluster group in the various communities

Cluster group	Community Conalum (%)	Poting Bato (%)	Rizal II (%)	Tigbao (%)	Total (%)
1	33	12	21	35	100
2	16	12	44	28	100
3	31	31	13	24	100
4	19	51	19	11	100
5	29	14	31	26	100
Total (%)	26.2	26.2	23.6	24.1	100

14.3.2 Characteristics of Cluster Group 2 – 'Doubtful foresters'

Households that are members of cluster group 2 have, on average, the largest areas of land for farming and second largest cash incomes of all the groups. However, the variation within the group in these characteristics is large, as indicated by the mean centred coefficient of variance, and the ANOVA test for differences in land size are not significant at the 95% confidence level. Only 12% of households in this cluster group grow more than 50% of their total food requirements. This group has been termed the 'doubtful foresters' because they rate reasons for planting and managing trees highly, but appear to be highly concerned about the lack of support for tree planting and management relative to other constraints to tree farming (Figure 14.2). Nearly 90% of households in this cluster group report that they intend to plant some trees in the future. They have the lowest reported level of use of materials from public land of all the groups in the past or presently, possibly indicating that they lack experience in forestry activities, and yet nearly 30% of these households know how to register their trees with the DENR. Approximately 45% of these households are located in the barangay Rizal II (Table 14.20).

Table 14.21: Mean values of various metric socioeconomic variables of the cluster groups

Variable	Group number	N	Mean	Standard deviation	Mean centred coefficient of variance
Household gross yearly cash income (P)	1	43	45,495	42330.0	93
	2	25	62,582	65193.7	104
	3	45	69,171	80612.6	117
	4	47	33,199	24503.3	74
	5	35	54,803	43644.5	80
	All respondents	195	51,856	55163.6	106
Proportion of income from farming (%)	1	42	44	0.34	77
	2	25	46	0.36	78
	3	45	34	0.33	97
	4	47	54	0.36	67
	5	35	34	0.29	85
	All respondents	194	43	0.34	79
Remittance amount per year (P)	1	43	2,223	5034.9	226
	2	25	4,020	10504.4	261
	3	44	6,707	16049.8	239
	4	46	2,068	4680.1	226
	5	34	12,971	25334.7	195
	All respondents	192	5,351	14466.4	270
Average distance to farm plots (km)	1	43	2.50	4.37	175
	2	25	1.42	1.27	89
	3	43	1.37	1.52	111
	4	44	0.92	1.00	109
	5	33	2.27	3.04	134
	All respondents	188	1.69	2.68	159

14.3.3 Characteristics of Cluster Group 3 – 'Well-off Households

Households who are members of Cluster Group 3 are termed 'well-off households' because they have second lowest proportion of households below the poverty line, but again there is a large degree of variation between households within this group. These households have a relatively low level of interest in commercial tree farming and have the second lowest proportion of members that report they will plant trees in the future. Only half the households in this group own some of the land they use for farming and their ratings of importance for the 'tenure and space issues' as a constraint to tree planting and management is almost twice as large as their ratings of importance for other constraints. This may be because despite the relatively large size of their landholdings, only 53% of these households own some of the land they farm, though 40% reported having formal lease contracts on land they do not own. They are the least reliant on farming for their income and would appear to be more interested in expanding their non-farming activities rather than concentrating their capital in their farming activities, as evidenced by the fact that they have the highest proportion of households with concrete housing. Despite their relatively high level of economic resources less than half the households in this group are interested in commercial tree farming and they have the second lowest proportion of members that intend to plant trees in the future.

14.3.4 Characteristics of Cluster Group 4 – 'Disadvantaged Households'

Cluster Group 4 households appear to be the most disadvantaged overall. Members have the lowest gross annual income, in part because they receive the least amount in remittances from outside the household, plus they have the greatest reliance on income from farming despite managing the smallest land size for farming of all the groups (Table 14.21). Cluster Group 4 have the highest proportion of members below the poverty threshold, are the least likely to have a formal lease contract on land they manage, have a high proportion of members with houses constructed of light materials, grow little of their own food, and have the lowest proportion of members that own at least some part of the land they use for farming (Table 14.19). Cluster Group 4 households have the lowest proportion of membership of community organisations and have the least interest in future tree planting or commercial tree farming (Table 14.19). Over 50% of this group reside in Poting Bato (Table 14.20). Members of this group gave the highest ratings of importance to all scales of reasons for and constraints to tree management. They are particularly concerned with 'space and tenure issues' as constraints to tree planting and management, and also gave high ratings of importance to tree protection issues relative to other groups (Table 14.7).

14.3.5 Characteristics of Cluster Group 5 – 'Experienced Foresters'

The households in Cluster Group 5 stand out for their relatively low dependence on farming for their cash income as well as a number of other reasons. The households in this group receive the highest amount of income from remittances, have the highest level of participation in community forestry programs and community organisations, have the greatest proportion of members with formal lease contracts, and the greatest proportion of members who grow more than 50% of their food needs. Nearly 90% of these households report that they intend to plant trees in the future and 75% express interest in developing commercial tree farms, and yet the households in this group rated the importance of all reasons for planting and managing trees lower than members of other groups, particularly the 'immediate' reasons for planting and managing trees. They also rated the constraints to planting relatively lowly, however, with the most important constraint for this group being 'financial viability issues', referring to the time taken for trees to mature, and 'support issues' (Table 14.7).

The most dramatic difference between this group and the others is in terms of the percent of members that reported using materials from public land in the past and in the present (Table 14.19). Eighty percent of these households reported that they used materials from public lands in the past, twice that of the next highest group. Furthermore, while the percentage of households continuing to use materials from public land has dropped dramatically for all but households in Cluster Group 3, the percentage of households continuing to use materials from public lands in Cluster Group 5 has only fallen to seventy four percent. This percentage remains more than three times higher than the proportion of any other group continuing to use materials from public lands (Table 14.19). The high use of public land materials implies that households in this group are experienced in forestry activities and want to use this experience to expand tree planting and management activities on their own land.

14.4 DIFFERENCES IN PRESENT TREE MANAGEMENT BEHAVIOUR BETWEEN CLUSTER GROUPS

Differences were found between the cluster group households in terms of the frequency of various types of trees they are presently manage on their farms (chi-square p = 0.003, Tables 14.22 and 14.23). The differences between the groups in terms of the characteristics of the trees they are growing are consistent with the socioeconomic differences between them and are consistent with the differences in the ratings of importance given to the various scales for various reasons for and constraints to tree planting and management that were described in the preceding sections. It is expected that poor households will have a higher preference for growing species which provide a faster return in benefits due to their need for cash, lack of land and their insecure tenure. For example, Group 4 households are more likely to be growing non-premium timber tree species than would be expected if all the groups were equal in terms of the types of tree species they presently manage. The relatively high use of non-premium tree species and low use of premium tree species by households in Group 4 is thus consistent with their socioeconomic characteristics, given their rate of poverty, lack of land ownership, and high concerns about many issues as constraints to tree planting and management.

Table 14.22: Number of species of trees various types presently grown by cluster groups

Tree type classification	1	2	3	4	5
Timber, premium	126	73	95	93	80
Timber, non-premium	36	31	39	67	53
Fruit trees	74	49	57	86	44
Total	236	153	191	246	177

Table 14.23: Difference between observed and expected number of species of trees various types presently grown by cluster groups

Tree type classification	1	2	3	4	5
Timber, premium	16.1	1.8	6.1	-21.5	-2.4
Timber, non-premium	-17.2	-3.5	-4.0	11.6	13.1
Fruit trees	1.1	1.7	-2.0	10.0	-10.7

The enthusiasm of Group 1 households for tree planting and management, their lack of concern about constraints, and their relatively high level of ownership of land they farm, is consistent with the timber qualities of the species they grow and time taken for premium tree species to mature. The fact that a relatively high percentage of the households in Group 1 are also below the poverty threshold is interesting and helps to demonstrate that attitudinal factors and socioeconomic factors other than household cash resources have relationships with a households' tree management behaviour.

14.4 THE PREDICTIVE VALIDITY OF THE CLUSTER ANALYSIS SOLUTION

As described in Chapters 3, 4 and 5, one method to determine the 'validity' of a cluster analysis solution is to assess the predictive validity of the solution. This requires comparing the results of the tests of socioeconomic and behavioural differences between the groups with the results of previous studies to determine if they are consistent with each other (Hair et al. 1998). The previous studies of households' tree planting and management attitudes and behaviour are reviewed in Chapter 7.

In part the 'predictive validity' of the groups is determined by whether they differ in terms of their present tree management activities. Tests revealed that the cluster groups differ in terms of the types of trees they are presently managing on land they control, supporting arguments by Raintree (1991) and other authors that the characteristics of tree species grown by farmers are chosen by farmers to compliment their households socioeconomic characteristics. It has been found that the groups vary significantly in terms of their intention to plant trees in the future, their interest in commercial tree farming, and the intention to plant trees to produce timber for sale as described in the above sections. The similarities between the characteristics of the groups identified in this study and the socioeconomic characteristics identified as effecting tree management activities by previous studies are discussed in the following sections.

14.4.1 Comparison of the Characteristics of the Cluster Groups With Those Defined in Previous Typologies of Rural Households in Developing Countries

As reviewed in Chapter 4, three general types of households are defined by studies in developing countries. The first is the poorest households the members of which have the least access to land and farming equipment, tend to control the poorer quality land, and have less ability to access credit facilities to purchase seeds and fertilisers to undertake farming activities. The middle ranking households have greater access to productive resources than the poorest households, and may have some have family connections which send them remittances. The wealthiest households described by these typologies tend to have the greatest access to land, farming equipment and credit. They also tend to control the better quality land in terms of slope and soil fertility, and frequently receive a remittance from outside the community that provides them with capital to improve their agricultural activities. The characteristics of these general types are similar to those described in this study. Households in Cluster Group 4 display similar characteristics to the lowest ranking general type, those in Cluster Groups 1 and 2 are similar to the middle rank, with the households in Cluster Groups 3 and 5 most similar to the highest ranked general type.

14.4.2 Comparison of the Variation in Characteristics of the Cluster Groups with Variation in the Characteristics of Households Reported by Previous Studies to Vary with Households Tree Management Practices in the Philippines

It is difficult to directly compare the socioeconomic characteristics of the Cluster Groups with those defined by previous studies in the Philippines, as few of these used statistical testing of differences in characteristics between households exhibiting different types of behaviour. General comparisons can, however, demonstrate that the characteristics of the cluster groups are generally consistent with the variations in behaviour reported by previous studies.

Previous studies of tree management practices in the Philippines have associated variations in tree management with variations in the following characteristics (described in detail in section 7.4):

- Perception of the advantages of increased tree cover to address environmental degradation;
- Control of economic resources;
- Security of tenure over both trees and land resources;
- Perception of the advantages of tree management in providing livelihood security relative to other potential activities;
- Levels of formal education in the household;
- The ability to protect the trees from damage or theft; and
- Demographic factors, including the stage in the life-cycle of the household.

The awareness of potential of tree management activities to assist households to achieve their objectives is identified as an important influence on their behaviour by both theories about the relationship between socioeconomic factors and tree management practices and previous studies of these relationships in the Philippines. Variables relating to the factor ‘awareness about forestry’ that differed between the Cluster Groups in this study include:

- Their participation in community forestry projects and community organisations;
- The knowledge of how to register trees;
- Their ratings of importance for various reasons for tree management; and
- Past and present use of materials from public lands.

The cluster groups are further differentiated by the level and quality of the resources they control. These characteristics include:

- Their level of cash income (percent of households below the poverty threshold and the proportion of income they obtain from farming);
- The amount of the households total food requirements they are able to grow;

The security of tenure over the land resources managed by households also varies between the Cluster Groups, as anticipated based on assessment of the findings of previous research and assessment of theories describing the influence of socioeconomic factors on tree management practices. The Cluster Groups defined in this study vary according to:

- The percentage of households that have a formal lease on their farm lands; and
- The percent of households in the groups that own at least some of the land they use for farming.

14.4.3 Comparison of the Variation in Characteristics of the Cluster Groups with Variation in the Characteristics of Households Reported to Vary with Households Tree Management Practices in this Study

The differences in socioeconomic characteristics between households in the cluster groups are also similar to those identified as being related to tree management behaviour and attitudes for the whole sample that were described in Chapters 11 to 14. The groups identified in this study differ in terms of a number of characteristics that have been found to influence tree planting and management in previous research and in the testing undertaken for this study. A comparison of the socioeconomic variables found to have relationships with variations in present and intended tree management in this study is presented in Tables 14.24 and 14.25.

Table 14.24: Summary of categorical socio economic variables with significant relationships to variables indicating present and intended tree planting and management behaviour

	If presently managing trees	Presently growing timber for sale	If intend to plant trees	If differ between cluster groups
Cropping types	*		*	
Intend to plant trees	*	*		*
Presently growing timber for sale	*		*	
Number of farming plots used	*	*	*	
If have own land	*		*	*
If ever been member of a community organisation	*	*	*	*
Community	*		*	*
Proportion of staple food grown			*	
Proportion of total food grown				*
If livestock sold		*		
Highest education category		*	*	
Intend to plant trees to produce timber for sale		*	*	*
Have registered trees		*		
Know how to register trees		*		*
If have own transport		*		
Interested in commercial tree farming		*	*	*
If ever participated in a community forestry program		*		*
If presently use resources from public land				*
Used resources from public land in the past	*	*		*
Reason stopped using public land materials				*
Number of presently managing trees categories		*		
Interested in commercial tree farming		*		
Household construction materials				*
If below regional poverty threshold				*
If have formal lease contract				*

Note: '*' indicates significant differences were found between categories in statistical tests

The results of the cluster analyses serve to emphasise the importance of the level of resources controlled by household to enable them to undertake tree farming activities, together with the influence of the farming system used by the household, the proximity of the land farmed to the household and the management strategy adopted for the land. The results of the cluster analyses also stress the relationships between households' socioeconomic characteristics and the characteristics of the tree species used by different types of households, in particular the time taken for the trees to provide a return on invested resources.

Table 14.25: Summary of correlations between the number of trees presently managed and number intended to plant by the household, differences between cluster groups and continuous variables

	Number of trees presently managed	Intended no. of trees to be planted	If differ between cluster groups
Constraint scale - tree crop protection	+		*
Constraint scale - financial viability		-	*
Reason for planting scale – long term		+	*

Note: '*' indicates significant differences were found in statistical tests. '+' indicates a positive correlation was found between the variables, '-' indicates a negative correlation.

Importantly, the tree management behaviour and intentions of the cluster groups make sense when consideration is given to the interrelationships between their socioeconomic characteristics and their attitudes, as demonstrated in the previous section. Given this, and that the socioeconomic characteristics of the types are consistent with the tree management behaviour of previous studies and theories, it is concluded that the cluster analysis solution does have predictive validity. The differences in tree planting management attitudes, behaviour and in socioeconomic characteristics of the types are consistent with, and offer fresh insight into, the perspective provided by previous research and theories concerning the influence of socioeconomic factors on tree management practices of smallholders. Therefore the collection of Cluster Groups can be considered as types of a typology.

14.5 SUMMARY

This chapter describes a typology of rural households in four rural communities in Leyte province in relation to tree management, including description of the methods used to create, and partially validate, the typology. The types were defined using a series of cluster analyses of households' ratings of importance of various reasons for and constraints to tree management on land they manage. Interpretation of the types was based on analysis of both the differences in attitudes between households in the various types and tests for differences between the socioeconomic characteristics of the types. Using information about the attitudinal profile of the groups of households in conjunction with data about their socioeconomic characteristics and their tree planting and management behaviour and intentions, a typology of landholders was developed. Groups were described and named so as to summarise the important facets of their characteristics and circumstances in relation to forestry development.

Five Cluster Groups or types of households were defined through the use of a series of cluster analyses. The groups differed in terms of their ratings of importance for various potential reasons for and constraints to tree planting and management, with each group having unique combination of ratings, or attitudinal profile, that characterises their position in relation forestry development. Differences in the socioeconomic characteristics of the members of the various groups include the level of economic resources controlled by the households, including their security of the tenure, and degree of reliance on agriculture or fishing for their livelihood. The various types also differ in terms of their present tree management activities, their experience in using materials from public lands or native forests, and their intended tree management activities.

Validation of the typology included the use of a variety of cluster analysis methods to create the typology and comparison of the differences in socioeconomic characteristics and tree management behaviour of the Cluster Groups with the findings of previous research into the relationships between socioeconomic factors. The validation processes revealed a high level of consistency in the characteristics, attitudes and behaviour of the Cluster Groups across a variety of cluster analysis methods. The attitude profiles of the Cluster Groups, their socioeconomic characteristics and their tree management behaviour and intentions are also consistent with the results of testing of relationships between these factors undertaken for this study. It was therefore concluded that the cluster analysis solution presented has predictive validity.

Chapter 15

PROCEEDINGS AND RECOMMENDATIONS ARISING FROM THE WORKSHOP HELD TO DISCUSS FORESTRY POLICIES IN LEYTE

Following the preliminary analysis of data collected during the survey of communities and households and the holding of a series of validation focus group discussions in each of the communities to present the findings, it was decided by the research team to hold a workshop to discuss the policy implications arising from the survey findings. The primary aims of the research team were to present the findings from the survey to those involved in administering small-scale and community forestry development programs in Leyte, and to generate a set of recommendations for policy reform and actions by government and non-government agencies associated with forestry development in Leyte.

This chapter provides a summary of the proceedings of the workshop and presents a discussion of the recommendations of policy reforms and actions that could help to further the development of small-scale and community forestry in Leyte Province. These recommendations for improving forestry development were circulated among participants of the workshop for their consideration, suggestions for improvement, and following their approval, presentation to the appropriate agencies. In the first section of this paper, the procedures used in the workshop are described. The second section discusses the common themes emerging from the workshop and the final section describes a series of recommendations or resolutions for consideration by the participants.

15.1 THE RATIONALE FOR THE POLICY WORKSHOP, THE PARTICIPANTS INVOLVED AND PROCEEDURES FOLLOWED

The workshop to present and discuss the findings from the household and community survey reported in this thesis was held on the 15th of April 2003 at the College of Forestry, Leyte State University. The decision to hold the workshop was taken following discussions between the research team involved in the ACIAR Smallholder Forestry Project about the best means to communicate the findings of the research to and get feedback from the stakeholders involved in small-scale forestry development programs in Leyte province. While the validation focus group discussions held in each of the communities following the preliminary analysis of responses to the survey had provided the opportunity to present the findings from the research activities to members of the participating communities, these meetings failed to generate much discussion about the policy implications of the findings, and did not involve stakeholders from national government agencies who are involved in forestry development. It was thought that holding the meeting at the College of Forestry would provide a ‘neutral’ venue that could allow participants to express their opinions freely, plus provide the opportunity to generate discussions about the socioeconomic factors affecting forestry development that are common to all of the participating communities.

The participants at the workshop included three representatives from each of the four communities involved in the survey, representatives from the government agencies involved in forestry development, and members of the ACIAR Smallholder Forestry Project research team. Members of government agencies included representatives from the provincial (PENRO) and sub-regional (CENRO) offices of the Department of Environment and Natural Resources (DENR), a representative from the Department of Agrarian Reform (DAR), plus representatives from each of the Local Government Units (LGUs) that cover the communities involved in the survey.

The workshop had three main sections. The first section included introductions of the participants and presentation and discussions about the findings of the survey analyses which involved all the participants. In the second section of the workshop, the participants were divided into three groups for discussions about the findings of the survey and ways in which forestry development policies and programs could be improved. The groups were formed on the basis of the organisational affiliation of the participants. One group included the community representatives, another included the representatives from the LGUs, and the third included the representatives from the DENR and DAR. In the third part of the workshop, each of the three groups formed in second section presented their ideas to all of the participants and discussions were held about the topics that were covered. These presentations are detailed in Appendix D. The topics that the organisers asked the groups to address included land ownership and tenurial security, tree registration policies, and alternative livelihood options associated with forestry development programs. The groups were asked to consider their present level of knowledge about tree management and land tenure regulations and recommend means to improve policies and regulations relating to tree management. Discussions about other topics relevant to forestry development were also welcomed.

15.2 COMMON THEMES OF THE FORESTRY POLICY WORKSHOP

The discussions during the workshop highlighted a number of issues about the policies pertaining to tree management which may be restricting the development of small-scale and community forestry. The underlying concern is that the DENR currently lacks ‘visibility’ in the communities, resulting in confusion about the implications of tree management for rural households. The issues are:

- the lack of knowledge among the LGUs and communities about the policies and regulations relating to tree management and land tenure status;
- concern about the lack of stability of these policies and regulations; and
- concerns about means to sustain livelihood activities of households wishing to engage in tree planting and management.

The presentations of the three groups (national agency representatives, LGU representatives and the community representatives) revealed differences in knowledge about tree management and land tenure policies between the groups. While the DENR representatives are knowledgeable about land tenure and tree registration policies, and were able to explain the policies to the participants, the representatives from the LGUs and the communities knew very little about the policies and had many questions about them and the way they are administered. The lack of knowledge about the policies exacerbates the problems caused by the lack of policy stability in relation to tree management. It is difficult for farmers to assess the suitability of tree-farming and stability of regulations and policies if they are unfamiliar with the policies and their implications. Much of the discussions about the security of property rights over land and trees centred on the lack of success of the DENRs’ Information, Education and Communication (IEC) program and the need for community members and LGU personnel to be better informed about property rights issues.

The difficulty of sustaining household livelihoods while waiting for tree crops to reach harvest age was another common concern of participants. They felt that the long-term nature of tree farming stresses the need for effective communication between the various agencies involved in land management. All of these agencies have differing areas of expertise that are required to assist farmers in developing sustainable farming systems, such as the knowledge about agriculture of the Department of Agriculture, and the ‘local knowledge’ of the LGUs.

In the following sections the implications of the workshop in relation to the development of Information, Education and Communication (IEC) programs, tree registration and livelihood support for smallholders are discussed.

15.2.1 Possible Directions for the DENR Information, Education and Communication program

The DENR representatives indicated that the IEC program of the agency is not, to their knowledge, the responsibility of a specific section within the agency, but rather it is a general statement of the desirability of maintaining an effective level of communication between the personnel of the agency, the personnel of other government agencies and the public. This is confirmed in the Revised Master Plan for Forestry (UNFAO DENR 2003). This Plan states that the Forestry Extension Division of the former Bureau of Forest Management was absorbed into other sections with the start of the Integrated Social Forestry Program in 1982. When the DENR was reorganised in the late 1980s forestry extension and information was integrated into a number of sections and an Office of Public Affairs created. The Revised Master Plan for Forestry (UNFAO DENR 2003, p.77) lists a number of factors that have constrained the effectiveness of the present IEC program of the DENR, including:

- Negative public perception on the forestry sector;
- Weak linkages with advocacy groups and other stakeholders in forestry IEC;
- Inadequate information and unclear procedures and requirements for participation in forest development programs;
- Inadequate trained IEC personnel; and
- Lack of an integrated IEC plan.

The participants from the LGUs and communities at the workshop clearly felt that the present approach to IEC programs of the DENR has not been effective, and agreed with the list of factors constraining the success of the program in the Revised Master Plan for Forestry that are listed above.

The discussions generated a number of suggestions of possible ways to address what the community and Local Government Unit representatives see as a deficiency in information about tree management and land tenure issues. Suggestions to improve the communication about tree management policies by workshop participants have two main thrusts. The first includes calls to formalise the IEC program of the DENR, to provide the program with the personnel, budget and other resources to undertake the required extension activities. These suggestions mirror those of the Revised Mast Plan for Forestry in the Philippines, which also stresses the need to formalise, strengthen and integrate the disparate IEC program of the DENR (UNFAO DENR 2003). The second approach to improving the IEC program concerns strengthening the relationships between the DENR, the local government units, the Department of Agrarian Reform and the Department Agriculture. Suggestions from the participants to improve communication between agencies included recommendations to place DENR liaison officers in the LGUs, the use of training seminars to educate LGU staff and to keep them up to date with changes in regulations, and suggestions that the responsibility for maintaining tree registration records is given to LGUs, together with supporting funding.

The suggestions of participants in the workshop described above are not necessarily independent of each other. For example, it was suggested that the responsibility for tree registration could be moved to the LGUs following seminars run by the DENR to train the LGUs on how to undertake the tasks. This process could be supported by having DENR officers permanently stationed in the LGUs, whose role would be to provide information about changes in regulations and advice about environmental management. The DENR officers stationed at the LGUs could, in turn, be supported by a section which works at a national level to develop suitable extension materials for use with the LGUs and with communities directly.

15.2.2 Advantages and Disadvantages of Decentralising Tree Registration to Local Government Units

As described in Chapter 6, the LGUs already have the responsibility of managing the majority of existing CBFMAs and have responsibility for initiating new agreements. The representatives from both LGUs and the communities were supportive of the idea of moving responsibility for tree registration to the LGUs. Some participants suggested that the responsibility be moved to the barangay councils. One advantage of the decentralisation of these responsibilities were seen to be the potential to reduce the transaction costs associated with travel to DENR offices to obtain tree registration and transport certificates. These costs are currently borne by farming households, and serve as a disincentive to tree planting activities. If households had regular and less costly access to knowledge about tree registration and management, they would be more likely to register their trees, and undertake further tree planting.

Apart from reducing the costs for farmers of tree registration, a further advantage of increasing the role of LGUs in the tree registration process and the undertaking of forestry development programs could be the greater ‘local knowledge’ of the LGUs about the areas they administer. Their familiarity with the social, environmental and ecological difficulties faced by communities could lead to more effective targeting of programs to develop and support tree planting and management activities of rural communities. Their physical proximity to the communities and intimate knowledge of the social, economic and environmental conditions in the communities could aid the effectiveness of extension programs, as well as assist the implementation and management of development programs, if they are able to help to plan, assess and modify programs to take into account local differences and problems. The cost of travel to the communities to administer projects is high for the staff of the national line agencies, making access to the communities difficult and thereby reducing their effectiveness. The relative ease of access of the LGU officials to rural communities means that it is likely that they could identify difficulties in programs early and, combined with their local knowledge, be in a position to address the difficulties more effectively than agencies that are located further from the communities.

Several potential disadvantages of increasing the roles and responsibilities of LGUs of project administration and tree registration were also discussed in the workshop. These include the small budgets of LGUs, their current lack of expertise or at least training in land and tree management regulations, and the need to maintain accountability over the exercise of powers decentralised at the LGU level. As Guiang (2002, p. 7) observed, the DENR has retained most of the power and authority regarding the allocation of forestlands in the Philippines, thereby preventing the LGUs and communities from exercising control of these areas:

> DENR remains to be exercising all powers and authority with respect to “allocation of forests and forest lands” e.g. issuance of long tenure on these lands, “issuance of resource use rights”, issuance of environmental compliance certificates (ECCs), and “releasing delineated A &D areas for titling” purposes. The continuing centralization of these powers at DENR puts local government units in a very precarious situation. Most LGUs would like to respond to the needs of CBFM communities; but, they play very marginal role in the issuance of tenure and resource use rights. Partial devolution of forest management to LGUs has been a major cause of contention between local government units and communities and DENR… DENR’s hesitance to “give away” public forests and forest lands to LGUs and communities, especially those areas that are not part of national protected area systems, has been

constraining the active participation of LGUs in the implementation of CBFM and co-management agreements in the Philippines.

It would appear from the discussions at the workshop that one major constraint to the decentralisation of tree registration responsibilities is the LGUs lack of resources to undertake this activity. The lack of public resources for environmental management activities is not, however, limited to local governments, with the budgetary concerns of the LGUs matched by those of the DENR. As discussed in Chapter 6, the DENR staff responsible for the management of forestry activities, including community forestry projects, are limited in their effectiveness due to the lack of resources to support their travel to the communities. The decentralisation of tree registration responsibilities to the LGUs would decrease the costs of visits to the communities, and the costs of farmers who must travel to register trees, obtain transport permits, and access advice about tree management issues. The LGUs have some rights under national laws to obtain 40 % of the funds raised through charges on forestry activities in their jurisdiction (Guiang 2001c). They are reliant on the DENR, however, to allocate public forestland for community forestry activities, and to provide a stable regulatory environment in which forestry activities can occur. The periodic cancellation of Resource Use Permits by the DENR can therefore adversely affect the financial position of LGUs as well as the finances of households in rural communities that use forestry activities as a source of livelihood.

The issue of maintaining accountability of officials administering tree management regulations in numerous LGUs as opposed to a smaller number of DENR offices was raised. This did not receive great attention following one participants' observation that the problem of accountability could also be applied to the existing arrangements that place the responsibility for management of the regulations in the hands of the DENR offices. Still, a number of authors have cautioned that increasing the powers of LGUs in relation to forest land management could be counter productive given the limited forestry expertise and finances of LGUs, as well as the lack of land use planning, tendency for frequent changes in policy positions in LGUs and potential for local elites to dominate at a local level (Byron 2000, Utting 2000, UNFAO DENR 2003).

In regard to the suggestion of having DENR liaison officers stationed at the LGUs, it can be observed that some DENR staff have already been decentralised to some LGUs. Informal discussions with some of these staff by the authors indicated that they are constrained in their ability to manage forestry development by a lack of support for travel, and a lack of information and extension materials developed by national and regional offices which they can use in communities. A further complication is the lack of enthusiasm of some LGUs for forestry development, with the work of DENR staff seconded to LGUs in some cases concentrated on monitoring mining and other activities that are thought to be more lucrative to LGUs than forestry development.

15.2.3 Livelihood Support for Small-scale and Community Forestry

The issue of livelihood support for farmers engaged in tree planting and management activities was of concern to participants. Several agroforestry options were discussed, with some participants expressing confidence that viable production systems had been developed, while others raised concern about the financial viability of some of these options. Some participants called for assistance to be given to community groups to assess the financial viability of enterprises that may potentially provide improved livelihood support options for rural households. The importance of effective communication between government and non-government agencies with varying expertise in agroforestry practices was stressed by participants as a means to improve agroforestry options for farmers. Utting (2000) also highlights the need for the formation of alliances of diverse groups at local, national and international levels if participatory approaches to development are to succeed.

The small areas of land available for most households for farming was discussed as an issue related to the need for livelihood support for farmers engaged in tree planting and management. While agroforestry practices and the development of alternative enterprises may assist to improve household livelihoods, their effectiveness in terms of also assisting the revegetation of the landscape is still limited by the amount of land available for households to use, plus their security of tenure over the years taken for trees to reach harvest age. Some questions raised by the community representatives concerned the possibility of using public forestland, much of which is in fact cleared, for tree planting and management activities. The DENR representative explained that it is currently not possible to register and harvest trees grown on land not classed as Alienable and Disposable (A&D). One participant requested that the workshop participants recommend that households be allowed to plant and harvest trees in non-A&D areas. It should be noted that providing access to land in public forest lands for rural communities this is one of the objectives of the Community Based Forestry Management Program. It is important that all the stakeholders involved in land management in the

Philippines work together to establish and implement strategic planning to tackle the issues of rural poverty and environmental degradation affecting Leyte province and other parts of the Philippines. Numerous authors have stressed that the lack of land use planning is a critical factor constraining the development of small-scale forestry in the Philippines, including de los Angeles (2000), Guiang (2001c), and the UNFAO DENR (2003).

15.3 CONCLUSIONS AND RESOLUTIONS FROM THE WORKSHOP

From the responses to the household surveys and the questions and observations of the community representatives at the workshop, it can be seen that smallholders are concerned primarily with securing their rights to harvest trees for household construction. The great majority of households are currently concentrating on growing trees for their own needs rather than for commercial reasons. The time delay in returns from tree management relative to other agricultural crops, concern about the complexity and uncertainty of forestry policies, lack of coordination between government and non-government agencies, and lack of knowledge of how to market tree crops all act to restrict the expansion of smallholders' tree management activities. As described in Chapters 2 and 6, these issues reflect the situation confronting smallholders throughout the Philippines.

The lack of information about tree management regulations and policies among the LGUs and the community members was the dominant issue discussed in the workshop. While the DENR representatives were able to outline the tenure regulations and tree registration procedures during their presentation to the workshop, it is apparent that the community members and local government officials would benefit from more information about these topics. Various suggestions were offered as to how this may be achieved. The first step would appear to entail providing information about the current regulations and policies to communities, either by DENR staff directly, or via the LGUs and other organisations. The issue of continuing to provide up-to-date information about tree planting and management regulations and support for development of enterprises like furniture manufacturing that use timber were also considered. Suggestions for these activities again involved the DENR, working in partnership with staff from other government and non-government agencies that have an interest in agriculture, forestry and environmental management issues.

The possibility of decentralising the responsibility of managing tree registration policies to

LGUs and increasing the role of LGUs in community forestry programs was discussed as a possible means to increase the effectiveness of the policies and programs. Many of the participants expressed the view that the LGUs are better placed to service these programs if they have the resources to support their activities. Although the participants were in general agreement about the need for more information to be supplied to LGUs and communities about land tenure and tree management regulations and policies, and agreed that the sufficient resources will be required for information program if it is to be a success, none of the participants suggested any means to provide this extra funding. Identification of ways that these government agencies can fund these extra activities when they already appear to be financially constrained will be important if they are to be implemented.

The following series of recommendations were offered for consideration by the workshop participants for presentation to the DENR.

The participants at the workshop recommended that:

1. The DENR produce extension materials and provide training activities suitable for Local Government Units and rural communities to explain the existing land tenure and tree planting and management policies and regulations.
2. Personnel be made more available to process tree registration and transport applications as well as answer inquiries about specific situations and decisions relating to land management faced by rural households and communities that may result in legal sanctions against them or against others.
3. The role of LGUs in administering forestry and land management regulations be reviewed, in particular the possibility of LGUs taking responsibility for the administration of the tree registration applications and approvals.

In the following chapter, which concludes the thesis, these policy issues are discussed in more detail with reference to the results of the literature review and the analysis of responses to the household and community survey. The following chapter examines whether the typology also has practical utility, the capacity to aid the design and administration of smallholder forestry development programs.

Chapter 16

PATHWAYS FOR THE DEVELOPMENT OF SMALL-SCALE FORESTRY IN THE PHILIPPINES

The research problem posed at the commencement of this thesis was: 'What are the social and economic factors that affect the development of small-scale forestry in the Leyte Province, the Philippines, be identified, and how can the social and economic diversity in rural communities be defined and described so as to assist in the design and delivery of rural and natural resource management development programs?'

From this research question, two further research questions were defined, these being:

'What are the social and economic factors affecting the development of small-scale forestry programs in Leyte Province, the Philippines?'; and

'Is it possible to develop a typology to define and describe the variations in tree planting and management attitudes and behaviour within rural communities in the Philippines in a manner that will assist in the design and delivery of small-scale forestry development programs?'

The results of community surveys and statistical testing of relationships between socioeconomic factors and tree management behaviour and intentions, together with the typology of households, revealed that a variety of factors affect the desire and ability of smallholders to participate in forestry activities. This chapter summarises the differences in socioeconomic characteristics between those households with varying levels of present involvement in forestry, and varying interest in future tree planting and management. The implications of the typology are discussed with a focus on the practical utility of the typology for aiding the planning and administration of forestry development programs in Leyte. The penultimate section examines whether the enabling conditions for the development of small-scale forestry in Leyte are in place, in terms of social, economic and political factors that affect the ability of small-scale farmers to participate in forestry activities, and discusses potential policy changes that may improve the prospects for smallholders wishing to develop their forestry activities. The chapter concludes with a number of suggestions for further research that may aid the development of small-scale forestry in Leyte.

16.1 VARIATIONS IN TREE PLANTING AND MANAGEMENT BEHAVIOUR BETWEEN HOUSEHOLDS

Households' tree management behaviour, intentions and attitudes were examined through a survey of four rural communities in Leyte province, the Philippines. The survey included structured interviews of 200 households from the four communities, together with a series of focus group discussions, and a workshop to examine the policy implications of the survey findings. Analysis of the survey responses reveals that there are differences between and within the communities in terms of the socioeconomic characteristics of the households and their present and intended tree management activities. Analysis of the typology of rural households reveals that each of the communities involved in the survey has varying proportions of each of the five landholder types described. The proportion of each community who are members of each of the types is illustrated in Table 16.1.

Table 16.1: Proportion of each cluster group in the various communities

Landholder type	Community Conalum	 Puting Bato	 Rizal II	 Tigbao	 Total
Confident farmers (%)	33	12	21	35	100
Doubtful foresters (%)	16	12	44	28	100
Well-off households (%)	31	31	13	24	100
Disadvantaged households (%)	19	51	19	11	100
Experienced foresters (%)	29	14	31	26	100
Total (%)	26	26	24	24	100

The types of households in the typology display greater internal homogeneity in respect to a number of socioeconomic characteristics than is found within each of the four communities. That is, the variation in socioeconomic circumstances of households within communities is greater than that between particular households from different communities which are in the same type. The implication of this finding is that a single approach to encouraging forestry development is unlikely to be able to address the particular socioeconomic circumstances and value systems of the various types of households within any one community. The differences in the control of resources by and status of households within communities emphasises the need to be aware of the possibility of less powerful households being marginalised in the development process and potentially losing access to resources that are presently open-access. It is likely that forestry development programs need a variety of approaches to address the differing requirements of the various types of households within any one community, and that forestry development alone will not be sufficient to improve the livelihoods of rural households in Leyte. This situation needs to be accounted for during the planning of forestry and community development programs at the regional, provincial or possibly national level.

Analyses of survey data revealed that tree management is a common part of land management practice of households in Leyte Province. Most households surveyed (approximately 80%) indicated that they are presently managing at least a few trees which they have either planted themselves, or which have regenerated naturally and been allowed to grow on land they manage. The primary purpose of most tree planting and management activities is to supply timber for the households' own needs. Only 10% of respondents indicated that they intend to sell trees they are presently managing, and 25% stated that they intend to plant and manage trees for the production of timber for sale in the future. Approximately 60% of responding households indicated an interest in developing commercial tree farming on the land they manage. Thus it would appear that small-scale commercial tree growing is uncommon at present, and that many households are interested in developing their tree planting and management activities but feel constrained from participation by various factors.

The analyses of the relationships between household socioeconomic characteristics and present and intended tree management behaviour revealed the importance of particular socioeconomic factors in influencing households present and intended behaviour. The level of resources controlled by the household, in terms of the area of the land managed by the household and their cash income, are correlated with higher levels of participation in forestry activities, and greater intentions to plant higher numbers of trees in the future. Some farming system variables are also related to higher levels of tree planting and management activity. For instance, those households which manage livestock and farm plots that are located remote from their house are more likely to be presently managing greater numbers of trees and more likely to be intending to plant a higher number of trees in the future. The area of farming land operated by a household and their level of cash income are, in general, positively correlated to the active management of trees on their land as described in Chapter 12. There are, however, patterns of exceptions to this trend of higher resource levels relating to higher levels if tree management.

As described by previous studies and reports by theorists who have examined the socioeconomic factors affecting landholder behaviour, the factors of education, awareness of practices, community stability and household value systems are also related to land management behaviour, thereby complicating the relationships between present and intended tree management and the level of productive resources available to households. Numerous relationships were identified in Chapters 11 and 12 between households' attitudes, their socioeconomic circumstances and their tree management behaviour and intentions. These attitudes to forestry development complicate the relationships between socioeconomic characteristics and the behaviour of household members. For example, households in cluster group 3, the 'well-off households' (described in Chapter 14), have higher than average cash incomes and a high proportion of members with houses constructed with concrete, but they have relatively low interest in developing commercial tree farming on the land they manage. In contrast, for cluster group 1, the 'confident farmers', a high proportion of these households are below the poverty line, yet a higher proportion of this group have an interest in commercial tree farming than that of group 3.

16.2 LAND MANAGEMENT CULTURE IN RELATION TO TREE PLANTING AND MANAGEMENT INTENTIONS

The results of the cluster analyses aid the identification and description of the relationships between the socioeconomic characteristics of households, their attitudes to forestry development and their present and intended tree management behaviour. The development of a typology of rural households in Leyte Province is one means to assess the way these factors combine to produce variations in both present and intended tree management behaviour. The implications of the typology of households for the design and administration of forestry development programs are discussed in this section.

The analyses presented in Chapter 14 reveal that households that are members of different types within the typology are presently using different types of forestry practices to suit their needs, and indicate that the intentions of members of these cluster groups to expand their future tree-farming activities also varies. Of the five groups that were defined by cluster analysis, three of them expressed high levels of interest in tree farming activities, and two groups expressed less interest. The two groups of households with low interest in tree farming activities will be discussed first.

Groups not intending to develop their forestry activities

More than half the members of the 'disadvantaged households' and the 'well-off households' have no interest in commercial tree farming. While the groups share a lower than average interest in tree farming, they differ from each other in respect to their cash income levels and their reliance on farming for income. Where the 'disadvantaged households' have the lowest cash income and highest reliance on farming to produce cash income of any of the groups, the 'well-off households' have relatively high cash incomes and low reliance on farming for income.

The 'disadvantaged households' are concerned about all the potential constraints to tree planting and management and would appear to require the highest levels of assistance in terms of greater access to land, tenure security, livelihood support and management advice, if they are to be able to engage in forestry activities.

In the case of the 'well-off households', they appear to be in a stronger financial position to cover the initial investment required to develop forestry, but the majority are not eager to do so. Their primary concern is 'tenure and space' issues, with other constraints to tree planting and management given low importance ratings. With these 'well-off' households primarily relying on non-farm income for their livelihood, and having land ownership levels below those of other groups (with the exception of the 'disadvantaged households'), it is possible that they want to concentrate their resources on developing their off-farm livelihood activities, and that they are unwilling to reduce their current food production. These households have partly overcome the financial limitations of relying on farm products to support their livelihoods, but appreciate the need for a diversity of livelihood sources in risk management. In other words they may view the maintenance of their food production as a way of reducing the risks they face in sustaining their livelihood from off-farm sources.

Groups that do intend to develop their forestry activities

The groups of households that do have high levels of interest in commercial tree farming are the 'confident farmers', the 'doubtful foresters' and the 'experienced foresters'. The 'confident farmers' rated the importance of all constraints to tree planting and management lower than the other four groups. Nearly 75% of the households in the 'confident farmers' group have cash incomes that are below the poverty threshold, the same proportion as in the ‘disadvantaged households’. It is also true that more than 50% of houses belonging to members of this cluster group are constructed with light materials, and yet group members’ greater levels of land ownership, capacity to produce a greater proportion of their own food requirements and lack of concern about the constraints to tree planting and management contribute to this group having the greatest interest in commercial tree farming. Unlike members of the ‘well-off households’ group, members of the ‘confident farmers’ group appear to see the development of their farming activities as a means to improve their livelihood. They also tend to manage land that is further away from their dwellings, and may see tree farming as a way of using these farming plots productively, thereby marking their ownership of the land, while at the same time reducing the labour requirements of their annual crop production. It is likely that the members of this group would be the most responsive to the provision of basic forestry development assistance such as the supply of seedlings.

The ‘doubtful foresters’ households have been so named because their main concern with developing tree management activities is the lack of support by government and non-government development agencies for these activities, and in particular the need for knowledge about silvicultural practices. They are less experienced in forestry, with the lowest proportion of households of all the cluster groups who used materials from public land in the past or do so at present. The ‘doubtful foresters’ lack of confidence in land management activities is highlighted by the fact that households in this group produce the lowest proportion of their own food requirements of any of the groups, and have the highest percentage of members that have attended agricultural training programs in the past. Members of this group have the greatest knowledge about how to register trees and they would be likely to respond to the development of robust silvicultural systems and the provision of training about tree planting and management by increasing forestry activity on the land they manage.

The final group with a high level of interest in developing commercial tree farming is the ‘experienced foresters’. Members of this group have the greatest amount of experience with using resources (i.e. timber) from public land and many continue to do so now. They also have the highest proportion of members that have participated in community forestry programs. It appears that most households in this group are accustomed to using forestry activities to support their livelihoods and would undertake forestry development on their own land if they viewed such activities as commercially viable. They are the only group that rated the items in the scale ‘commercial viability issues’ higher than other potential constraints to tree management. The time taken for trees to reach harvest age, difficulties in marketing timber, problems with policies relating to forestry and lack of labour to manage tree plantations are the most important constraints to commercial tree farming for households in this group.

It is difficult for tree plantations to compete financially with the harvesting of trees from native forests due to the absence of establishment costs of native forestry and the relatively high availability of timber resources compared to the time taken for tree plantations to reach harvest age. Households in the ‘experienced foresters’ group presently manage more non-premium species than premium species, i.e. they manage those species that reach harvest age earliest and are easiest to distinguish as not coming from native forests. It could also be that they tend to grow a higher than expected proportion of non-premium species because they continue to access their premium species timber requirements available from public land. The households in this group grow the highest proportion of their own food requirements, and have relatively high cash incomes plus low reliance on farming for their income. With their experience in both farming and forestry, high interest in forestry activities, and relatively high incomes, they would be likely to respond most strongly to the development of accessible markets for timber products.

16.3 THE SUCCESS OF COMMUNITY-BASED FOREST MANAGEMENT PROGRAMS

The community forestry programs and community organisations appear to have been successful in terms of providing a focus for those farmers interested in forestry activities. The organisations and programs appear to have included nearly all of the households within participating communities that have an interest in forestry development. Whether the organisations and projects increased the awareness of forestry issues, empowered community members and resulted in significant change in their livelihood, was not assessed by this study. The communities surveyed have had mixed experiences with community forestry programs. In some cases they have been successful in terms of revegetating areas of land, but in others they have not which has frustrated the participants. Some community forestry programs have run relatively smoothly and others have been hampered by lack of financial support or through delays in the provision of funding and even theft of organisation funds.

Community forestry programs have also been used as a form of social and economic development in the communities. Livelihood projects, education and training and community cooperation that are often associated with community forestry projects are popular among sections of the community that have participated in community forestry programs. In some cases, community forestry programs have been criticised on the basis that the benefits from them are co-opted by the elite in an area (Byron 2000). Tests for socioeconomic differences between those households who have participated in community forestry programs and those who have not failed to reveal any differences in terms of income or education levels between participants and non-participants. While the programs do not appear to have targeted only the 'poorest of the poor' as they are sometimes called upon to do, and those who participated in the programs have access to greater areas of farm land than non-participants, the programs appear to have been equitably administered.

One of the objectives of community forestry programs is to help bring an end to the clearing of trees in public forestlands. Those who report using the resources in public forests in the past have a higher participation rate in community forestry programs, suggesting that these programs have been successful in attracting those people who in the past had an impact on public forests. Those who have been involved in community forestry programs also ceased using public land resources earlier than those who have not participated. Those who have participated in community forestry are more involved in growing trees to sell for timber at present, and are more likely to be intending to plant trees for timber than those who have not been involved in community forestry projects. Those involved in community forestry projects also have a greater awareness of how to register trees, even though few people have actually done so.

As reported in the Chapter 14, over 60% of the 'confident farmers' and 'experienced foresters' group households presently belong to, or once belonged to, a community organisation, as have over 50% of households from the 'doubtful foresters' and 'well-off households'. The past and present level of participation in community organisations of the 'disadvantaged households' falls to 32% of households. The reasons for this lower level of participation are not clear. It may be that these households did not have time to attend the meetings and training provided by the organisation. It may also be that they felt unwelcome, or at least marginalised from the process. In the community Focus Group Discussions, the community members used derogatory labels to describe the attitudes of the 'very poor' households in the communities, and frequently referred to them as ‘lazy’ or as ‘drunkards’. It could be that the lack of respect given to very poor households discourages them from participating in the organisations.

16.4 THE POTENTIAL UTILITY OF TYPOLOGIES TO AID FORESTRY DEVELOPMENT

To assess the practical utility of the results of the cluster analysis, the question to be addressed is: ‘Does analysis of the cluster groups assist understanding of the variation in rural communities in a manner that will help the design and administration of programs and policies related to smallholder forestry development in Leyte?’

Assessing practical utility of a typology provides a means to assess the validity of a cluster analysis solution used to define the types (Hair et al. 1998). In marketing terms, a cluster solution is said to have practical utility if it allows different segments of a market for some product to be identified, and marketing mixes to be defined. A marketing mix may include the types of media and content of messages, and incentives or penalties used to influence the behaviour of users of the product. For the purpose of this study it is assumed that the ‘product’ is tree growing to assist the livelihood of households. It has been noted above that the cluster groups differ in terms of the mixture of various types of trees they manage on their land, and that the characteristics of these mixtures are consistent with variations in their socioeconomic circumstances. The understanding of the way that households use trees with differing characteristics, together with the understanding of their socioeconomic circumstances and attitudes to tree management, can be used to aid the design of agroforestry and plantation systems that will suit the households in the future.

The development of a typology of rural households based on their attitudes to forestry has demonstrated that it is possible to define and describe the intra-community variation in household socioeconomic circumstances and attitudes to forestry development in a manner that will assist the design and administration of forestry development programs. The interpretation of the typology helps to improve understanding of the factors affecting the development of small-scale forestry, and can assist strategic planning to facilitate forestry development.

Statistical tests on survey data and discussions with the communities revealed that there are a number of differences in the socioeconomic circumstances of households in the communities that participated in the study. As discussed previously, the degree of variation in socioeconomic circumstances within communities is great enough to mean that, in relation to the capacity of households to develop their tree management activities, there are in many cases greater similarities between households in different communities than between households in the same community. The implication of this intra-community variation for forestry development programs is that a variety of approaches are needed to help the variety of households that exist in any one community.

If the objective of forestry development programs was simply to increase the level of tree cover in communities then the typology could be used to identify the households that are most likely to increase their forestry activities with the least help, thereby making efficient use of forestry support programs funds. Forestry development programs have other objectives, however, including the reduction of poverty, necessitating that all types of households are considered. The approaches that could be used to assist rural households possibly include policy and regulatory changes, the development of land-use planning, and the provision of technical and financial assistance. The measures adopted to support small-scale forestry can be developed and funded at regional and national levels because similar groups of households exist in all of the communities that were surveyed, although the proportions of each 'type' of household vary between the communities.

One of the problems in organising communities and administering community forestry projects is the degree of variation in socioeconomic circumstances in the communities. The variation means that the '[a]ssumptions about the heterogeneity of community interests, and therefore their unity of purpose and willingness to organise, did not hold true.' (Bisson et al. 1997, p.25). These authors then concluded '[d]o not attempt to force an organisation where none exists. The time required to organise communities of people with heterogeneous interests should be measured in years, not weeks.' The findings of the cluster analyses and creation of the typology illustrates these variations in the communities. The variation in resources available to the various types of households and variation in their perceptions of the importance of various reasons for and constraints to tree management would mean that considerable time is required to negotiate the rules for the organisation and practices which would suit the requirements of various households.

16.5 PATHWAYS TO SMALL-SCALE FORESTRY DEVELOPMENT IN LEYTE PROVINCE: CREATING ENABLING CONDITIONS FOR RURAL HOUSEHOLDS TO PARTICIPATE IN FORESTRY ACTIVITIES

Whether forestry development programs succeed depends on the progress of community development in other sectors, including agriculture, health, education and transport infrastructure development (Arnold 2001). Policy reform may be sufficient to encourage some types of households to commence forestry activities or expand their existing activity. Other household types desire more technical assistance as well as financial assistance to maintain their livelihoods before they wish to engage in tree farming. While it is true that households in different situations require different types of assistance, there are a number of factors that, eventually, become relevant to all prospective small-scale foresters. Byron (2001) suggested that there are four key factors that determine whether smallholder farmers anywhere in the world will undertake commercial tree farming activities, namely:

- secure property rights to land and tree crops;
- a viable production technology;
- the capacity for crop protection; and
- adequate markets for tree crops.

Byron (2001) concluded that where these conditions are all met, forestry will develop naturally. He argued that the factors are like a set of four locks on a door and all of them must be 'unlocked' before the door can open.

In addition to the specific constraints to forestry development felt by various types of households, there are some broader policy, regulation and communication issues that appear to be constraining the development of small-scale forestry in Leyte. The way these broader issues affect the various types of households described by the typology also varies. Commercial small-scale forestry in Leyte is currently underdeveloped, with rural households commonly growing sufficient trees to cater for their own timber needs, but not enough to sell timber commercially. Survey data indicated that the 10% of households that are presently growing trees to sell timber are largely unaware of potential markets for their products and would like assistance in marketing their products. Survey data further indicated that despite the interest of 60% households in becoming involved in commercial small-scale forestry, responses to the Leyte community and household survey indicate that 90% have not yet done so. As reported in Chapter 12, those who are presently growing trees to produce timber for sale are differentiated from other rural households in terms of their control of greater quantities of resources and the greater security of those resources, and in particular their security of land tenure. It is apparent that not all the households that are relatively well-off are active in terms of commercial tree farming. A household's opinion about the viability of tree farming is also an important factor.

One means to assist in addressing the lack of land and financial capital for tree management by individual households is to support community forestry activities through community forestry programs. Survey respondents expressed some interest in community forestry programs as development projects but the level of interest is relatively small in comparison to some other issues, including health and transport infrastructure development (as reported in Chapter 9). Even when community forestry activities are included in a closed list of potential development programs, such activities received a low priority rating from households in the communities involved in the survey. More immediate concerns for the households differed between the communities, with households in Rizal II most concerned about the provision of potable drinking water, those in Tigbao are mostly concerned about the transport infrastructure of the community, and those in in Poting Bato concerned about road development, livelihood support and the need for community cooperation. Forestry development may not be the only or even the best option for households to escape from poverty in many circumstances.

In the following sections Byron's observations about the 'keys' for forestry development are used to structure discussion about the implications of the research for forest and private land management policy and programs at a national, regional and local level.

16.5.1 Security of Land and Tree Property Rights

Getting households to the stage where they have access to land, and are secure in their tenure, are crucial steps in promoting the development of forestry activities. In a national study of the status of natural resources in the Philippines, de los Angeles (2000) concluded that the more than 50% of the areas classified as public forestland are in fact cleared farm land and effectively open access areas. She concluded that the lack of land-use planning seriously constrains the effectiveness of the management of these resources. Findings from the research for this thesis reported in Chapters 12 and 13 confirm the relationship between property rights security and forestry activity, with increased levels of forestry activity undertaken and proposed by those households which perceive they have secure tenure over the land they use for farming.

The separation of public forestland into various tenure types is confusing for rural households and Local Government Units that are not informed of the regulations. Some areas are legally allowed to be farmed and may become available for purchase while others are fully protected as conservation zones but these areas are not delineated on the ground. In addition, while households are able to grow agricultural crops in classified forestlands and legitimise the activity through paying taxes to the LGUs, the growing and harvesting of trees in the same area is illegal. Many areas of Leyte Province are not covered by land management plans and urgently require such plans to be developed. Watershed management could be greatly improved by regional and watershed-scale planning. Watershed scale planning is a priority activity identified in the Revised Forestry Master Plan of the DENR (UNFAO FMBDENR 2003). Presently, insufficient resources, record keeping and planning are devoted to natural resources by LGUs (Bisson et al. 1997). Land tenure maps are difficult or impossible to obtain, as are statistics about the areas of land managed by LGUs under various classifications of the national government agencies. The LGUs are supposed to monitor and promote forestry activities but in all the areas that were surveyed they do not know which areas in their jurisdiction may be developed legally according to national laws and regulations.

Several reviews of forestry policy in the Philippines have concluded that an ad hoc approach to environmental management and the blocking of key legislation by elements within the national government have resulted in the overuse of administrative orders to regulate forestry (Utting 2000, Guiang 2001c, UNFAO DENR 2003). The proliferation of administrative orders, delays in their application, and the general lack of information for rural households about changes in regulations diminish these households' sense of security of property rights for land and trees. Commitment to the resolution of the contradictions and complexities of forestry policy at a national scale is required, as argued in the Revised Master Plan for Forestry (UNFAO DENR 2003, p. 128 – 9):

> The situation of fragmented promulgation of policies related to forestry, makes it difficult to pin down what the current forestry policy is. In addition to being not readily available and tedious to consolidate, the current practice results in varying versions, leading to inconsistencies of policies. This situation gives rise to a felt and real need for a comprehensive forest sector policy to guide new legislation, new

initiatives, new plans and programs, and day-to-day decisions to address current and expected concerns, problems and challenges in sustainable forest resources conservation, development, management and utilization. The passage of a bill on sustainable management of forest resources (House Bill No. 1713 known as New Forestry Code) was submitted to the Congress in 1990. The Bill has not yet been passed. Reason for the delay is not clear. It is understood that the draft of the bill on sustainable management of forest resources is being recast into an EO (Executive Order); and that it is likely to be approved in that form.

Other laws directly affect the land resource security of rural households and titling issues, including the *Public Land Act* (1936) which, according to the UNFAO DENR (2003) also urgently requires redrafting to reflect the current situation in the Philippines.

On a number of occasions during the study at community meetings and at the policy workshop, community members raised the possibility of planting trees on land that is classified as public forestland but is actually degraded grassland. It is one role of community forestry programs to provide communities with access to public lands that have potential for forestry activities. In some communities, people expressed disappointment about some community forestry programs that had failed to achieve the outcomes which had been specified for the projects. People in Tigbao in particular are eager to gain access to land that had been designated as part of the Community-Based Forest Management project in their area. A large proportion of this area was not planted following to the cessation of funding by the Asian Development Bank due to delays in meeting project targets nationally. Community members have argued that the delays were a result of drought that affected the country during the time when planting was supposed to occur, and that if they had continued planting trees at the time the trees would have died. Others have argued that often the needs of the donor organisation to commit funds and satisfy their own criteria have placed unrealistic expectations on the capacity of the local institutions to undertake large-scale revegetation program quickly (Arnold 2001, UNFAO FMBDENR 2003). The result cancelling programs is continued uncertainty and frustration for the community members.

Changing rural households' access to productive resources is a major undertaking and there will inevitably be 'winners' and 'losers' from the outcome of such a process. In many parts of the Philippines, and particularly the Visayas, land ownership is highly concentrated in the hands of a relatively small number of families, and very few rural households have access to land ownership. The provision of land security for both public and private lands in the Philippines is a pre-requisite to the development of smallholder forestry. Even with revision of forestry legislation there are no guarantees of the success of forestry development programs if these programs to provide land security are not carefully implemented. Changing access to land is complex and has to be undertaken carefully or may it result in undesirable outcomes. There is some danger that removing land from common property or open-access usage could restrict access to those households with no other land resources upon which to rely (Arnold 2001), or that local elites will capture the new resources (Byron 2000). Arnold (2001, p. 13) stressed the importance of forest resources as a safety net for the poorest households, arguing that collective control or common property rights systems are sometimes needed for equity and environmental reasons.

Apart from resolution of the tenure status of public forestland, is likely that agrarian reform in private lands will be needed before any improvements in household circumstances, let alone increased tree planting, will occur. This is particularly true in Poting Bato, where almost half the 'disadvantaged households' identified in the community surveys are located. The need for support can remain even if there is agrarian reform, with anecdotal evidence suggesting that many of the recipients of land through agrarian reform simply sell the land back to the original owner because they lack the capital needed to plant and manage crops. Increasing the number of households that legally own at least some land that they manage, together with provision of credit facilities, may encourage households to concentrate on developing their own enterprises rather than relying on the erratic availability of off-farm employment.

In defining land management plans the process of negotiating boundaries for forest areas and physically marking these boundaries takes resources. It is critical to develop trust between all the stakeholders involved in land management, and the time needed to do this is difficult to estimate (Bagadion 2000). Current communication between the communities, LGUs and Philippine national government agencies is poor. The empowerment of Local Government Units is crucial given their responsibilities in relation to land management.

16.5.2 Relationships between Forestry Policies, Regulations and Timber Markets

The lack of formal markets for timber is a fundamental obstacle to small-scale forestry development for rural households in Leyte Province. Even those households that are presently growing trees and planning to sell timber are unsure about where they will sell their timber and the price they may receive. These households frequently asked the enumerators during interviews where they might find a market for their trees. The problem is circular, with the lack of trees to sell preventing the establishment of markets, and the lack of a markets preventing the development of tree farming. From the literature review and the survey it is concluded that the large number of regulations about land management, tree harvesting and transport have not been effective in controlling the clearing of remaining native forests, and have constrained tree farming on private land by preventing the development of markets for smallholder-grown timber.

The lack of market development for small-scale forestry is partly due to the drastic restructuring of the timber industry following the banning of logging in native forests in 1992. The current effect of the regulations introduced to control logging in native forests is that there is virtually no formal market for timber. Few 'legal' sources of timber exist in Leyte according to the plantation registration records of the DENR, yet timber is still brought and sold. The markets for timber are currently satisfied through imports to the province, through households growing their own timber, and through timber from 'illegal' sources (Guiang 2001c). The extent of regulations is such that households must obtain permission to cut trees they have planted on their own land for their own use. The regulations create confusion and fear for farmers, who hear stories of people jailed for (apparently illegally) harvesting trees which they planted themselves and used for their own housing. The regulations also provide opportunities for rent-seeking officials to impose additional fees and thus extract any profits that may be generated from forestry activities. The effect is that people mostly avoid the legal and financial complications of tree registration and simply act outside the law in growing and harvesting their own trees. They avoid the potential for prosecution by not trying to sell timber formally, or sometimes by converting the timber to finished products (including charcoal) before selling it.

Households that are on or below the poverty threshold cannot be expected to devote time and resources to an enterprise that has highly uncertain returns. Because tree farming is a long-term investment, it will not occur until people can be certain they will be allowed to sell their timber in a fair and open market. In Leyte there is active participation in timber and lumber production by farmers for their own use but the formal timber market is undeveloped. The operation of open, fair markets is one prerequisite for the development of smallholder forestry, but can potentially adversely affect the position of weaker households in communities as forest resources become more valuable and the stronger households in communities move to control the resource (Arnold 2001).

16.5.3 Viable Tree Production Technologies

Studies of the profitability of commercial tree farming in the Philippines by Carandang *et al*. (2000) and Venn (2001) have indicated that tree farming is potentially a profitable activity. They also caution, as did Stark *et al*. (2002) and DENR (2004), that the present management of small-scale tree farms in the Philippines lacks the silvicultural rigour required to maximise the productivity and market value of the trees. The household survey revealed that few rural households seek professional advice about their tree management activities. Analysis of the quality of propagation materials [the germplasm] used by farmers has revealed that in most cases the germplasm is low quality (Gregorio et al. 2004). Responses to the household survey revealed that rural households are opportunistic in their selection of propagules [germplasm]. Most are heavily reliant on the collection of wildlings to provide planting stock or else depend on gifts from friends and neighbours and free seedlings from government agencies. Greater assistance is required for farmers to choose species to match the biophysical conditions of their land as well as more tree management training activities.

The requirement of viable production technologies implies the need for economic viability of tree management activities to be considered. One factor is ensuring that the silvicultural management is of high quality. Another factor required to improve the perception of the financial viability of tree farming is to ensure some certainty about forestry regulations and markets. An information program about land and tree management regulations would be a first step in enabling those who already have knowledge about how to manage trees – the ‘experienced foresters’ and ‘confident farmers’ – to assess better the viability of tree farming. Even for those households that do have a reasonably secure livelihood, there remains some doubt about the profitability of tree farming. While provision of information about the rules and regulations applied to tree farming could help to clarify the availability of markets for timber, analysis of the profitability of tree-farming is also required to allow comparison of this enterprise with alternative land uses such as vegetable production. Detailed analysis of the costs and returns for various types of potential tree farming could assist in encouraging those with available land and finance resources to invest in tree farming. Such information is presently not widely available.

Receiving price signals from a market is critical for farmers to be able to assess the viability of small-scale forestry. If the farmers are able to satisfy themselves that tree farming is commercially viable, it appears that a substantial proportion of rural households – the ‘experienced foresters’ and ‘confident farmers’ – are likely to take up commercial tree growing. The ‘doubtful foresters’ group is less confident about their capacity to manage successfully forestry activities and feel they would greatly benefit from the provision of technical advice about tree planting and management.

16.5.4 The Capacity for Crop Protection

The issue of being able to protect tree crops over the time taken for the stand rotation is another factor that is critical for the development of small-scale forestry. The scale ‘crop protection issues’ received low ratings of importance from all cluster groups except the ‘disadvantaged households’ who rated the importance of this factor as highly as the other potential constraints to tree management. The ‘crop protection’ scale included items related to environmental factors such as the risk of fire damage to trees and damage from typhoons. It also included items relating to the likelihood of ‘additional fees’ being levied by officials on tree farms, and the lack of access to community organisations (i.e. restricted membership policies).

All of the items in the crop protection scale can potentially be managed to reduce the risks to tree crops. Use of tree species that are wind-firm and the establishment of windbreaks can be used to reduce the risks stand damage from typhoons, firebreaks can be established and community fire plans implemented, and rules of community organizations can be specified to ensure that membership is open to all households. The management of the risk of additional fees is difficult for rural communities to control. Unless they are able to secure the support of powerful allies, or gain access to legal advocacy organizations, it is difficult for individual households to stand up to government officials that demand extra payments to process documents required to harvest and transport timber legally.

16.6 SUMMARY OF THE POTENTIAL ACTIONS WHICH MAY INCREASE SMALLHOLDER FORESTRY ACTIVITY

From the discussion above it can be concluded that a number of factors need attention if the enabling social and economic conditions that are required for forestry development are to be met. One main task is the revision of national forestry and land management legislation, together with the provision of long-term funds to implement the policies they contain. It is also necessary to address simultaneously the myriad of other social and economic development issues that face the Philippines. Once these requirements are achieved it may then be possible to undertake on-ground activities such as training in timber plantation management that will make forestry activities more attractive to smallholders.

Utting (2000, p. 208-209) argued that programs that aim to improve environmental management practices frequently fail to address the structural causes of environmental degradation, poverty and disempowerment. Without addressing the fundamental causes of these problems, he argued, ‘conservation efforts may well amount to drops in an ocean’. Utting (2000, p. 208-209) went on to state that the ‘People Power’ revolution of 1986 failed to

> ‘fundamentally alter the power structure in the Philippines … (so that) various policies and programs that have attempted to deal with serious problems of poverty, inequality, and environmental destruction have been blocked or diluted within the bureaucracy, the legislature, and the judiciary, at national and local levels, by conservative forces associated with the old oligarchy, the new urban elite and the military.’

Resource constraints and issues related to the culture of administration in the Philippines are restraining the potential development of smallholder forestry. The economic and social changes required to set the enabling conditions for smallholder forestry to develop in the Philippines are broad-ranging and will not be easily achieved.

One third of Leyte Province is classified as public forestland. Given that 50% of rural households have cash incomes that are below the official poverty line, that most households have access to small plots of private land, and that the opportunities for earning income off-farm are very limited, it is not surprising that the public forest land is under enormous pressure. Those interested in forestry development in the Philippines consistently call for the development of land management planning to provide greater security in regard to the tenure status of land and trees. The formulation of land management plans is likely to take time, and require extensive negotiations between national and local government agencies and communities, if they are to have the support of the various stakeholders involved in land management. The negotiations could begin the process of improving communication between the various government agencies and communities. There is a need to maintain these communications at formal and informal levels in order to sustain the trust of stakeholders, and provide them with the certainty about the poorly defined legal status of tree planting, management and marketing activities in varying situations.

Development of the capacity of Local Government Units (LGUs) to initiate, support and monitor natural resources management plans will be critical to helping develop small-scale forestry activities. The LGUs physical proximity to the communities and knowledge of the social dynamics of communities, together with their increased responsibility for natural resources management under Philippine law, means that they are well placed to facilitate the development of forestry enterprises. However, the small budgets of LGUs, their lack of personnel trained in forest management, and the lack of information available to them about national regulations of land tenure and tree planting and management constrains their effectiveness at present. They need to have increased budgetary allocations for natural resource management activities to match their increased responsibilities in this area, together with seminars and other information materials from the national agencies that would allow them to advise communities about the implications of tree management.

The present arrangement of tree registration requirements is not functioning well, as reflected by the small number of households that are following the requirements and the high level of confusion about the regulations. One option to improve this situation is to give the responsibility for processing and maintaining tree registrations to LGUs. This would substantially reduce the transaction costs for tree registrations that are borne by households, and improve their access to advice about regulations. An information dissemination program designed for rural communities could help to address the uncertainty about tree management policies currently felt by rural households. The participants at a policy development workshop from the communities and Local Government Units strongly recommended that a comprehensive information education and communication (IEC) program be developed by the national government agencies responsible for administering land management regulations. Much of the information that was requested relates to land and tree tenure policies.

Some researchers believe that the devolution of greater authority and power in regards to forest management to LGUs is a dangerous move because of their high susceptibility to domination by local elites (Utting 2000) and lack of continuity of policies UNFAO DENR 2003). As reported in the Revised Masterplan for Forestry (UNFAO DENR 2003, p. 52):

> It may seem easier to manage LGUs because they are smaller and have shorter lines of communication.

> Decisions can be made, transmitted to lower staff, and implemented on the ground relatively quickly. However, their organisational structure is often rendered less effective by short-sighted "tinkering" by elected political leaders facing very short tenures of office. Furthermore, the organisation is often weakened by undue political interference in the placement of qualified people within the structural framework. Resources available to LGUs are also limited. Often, vested interests come to play, especially in matters such as boundary delineation, issue of permits and licenses etc. Decentralisation without adequate planning and preparation and resources cannot be effective.

With nepotism and corrupt practices entrenched in virtually every administration in the nation (Jocano 1998b), the DENR and the Forest Management Bureau appears to be no better, or worse, than other administrations. Calls for reorientation of the values of the bureaucracy have been made by various authors including Utting (2000), and the UNFAO DENR (2003) in the Revised Master Plan for Forestry. It is difficult to envisage how the security of good governance practices, including policy stability, accountability and transparency, that are needed for promoting tree management and other long-term investments, can be provided in the near future. Jocano (1998b) traced the roots of nepotism to the centrality of the family in Filipino culture, with the family being the main source of social security and focus of peoples' lives. He stated that (p. 63):

> Observers have, again and again, remarked about the high rate of nepotism in both public and private offices. Seen from the prevailing emphasis on family loyalty and support, it is understandable why a government official or the head of a company in a private concern hires a relative, irrespective of the latter's qualifications, at the first opportunity. It is the concept of family solidarity that underlies this practice. A well-positioned relative embarrasses his family before his kin group if he does not do something for his relatives

Until Filipinos have faith in the State to provide fair and equal treatment of its citizens and cease to view corrupt practices as 'normal' privileges that accompany office bearing, the prospects for the enabling conditions for forestry to develop are remote.

It may be that the need for tree registrations could be dispensed with altogether if effective land management plans could be devised, critical areas of forest adequately protected, and the areas that are available for community forestry programs defined. The tree registration requirements are supposed to improve natural resource management by ensuring that trees from remnant native forests are not harvested for timber, yet cases of 'illegal' logging continue to occur, and farming practices continue to slowly erode the margins of forest areas.

The complications, costs and punitive measures related to these regulations mean that the net effect of them is to actually constrict the areas of the landscape that are under tree cover. The requirements for transport permits places cost burdens on the smallholders, and provides avenues for rent seeking behaviour by officials that erode the profit from forestry activities. The households that effectively control land management in the upland areas will not plant trees while they cannot have a guarantee they will be able to harvest and sell at least some of them.

Removal of tree registration requirements would substantially reduce the uncertainty about security of tenure over trees and place the onus for tree protection on communities themselves. Such a move is likely to be controversial, particularly if adequate land-use planning and protection of conservation areas cannot be guaranteed. It may be that the national and local government agencies would be more effective in maintaining or increasing the level of forest cover and the increasing the welfare of households in rural areas if they were to concentrate their limited resources on information provision and protecting forest cover in areas identified, through consultation between relevant stakeholders, as critical for watershed protection and biodiversity conservation. This, of course, assumes that the DENR will be willing and able to prosecute violations of the regulations relating to protected areas.

The use of participative approaches to land management has been weak in terms of the degree of autonomy and trust given to the communities. The community survey revealed a high level of awareness about the benefits of tree planting among smallholders that have participated in community forestry programs. It is the opinion of the author that the outcomes for environmental protection and community development would be better if, once management plans for critical areas have been negotiated by stakeholders, rural communities were granted greater responsibility and autonomy for the management of remaining open access areas that are already effectively under their control. It should be noted that the communities presently feel they lack the necessary skills to manage forestry and other development projects on their own. Continued capacity building and continued support for community organisations is also required.

Regardless of whether the regulations of forestry are changed, there is an urgent need for national government agencies to develop formal information, education and communication programs to improve awareness about land and tree management regulations. The level of awareness about the regulations is low among rural households. In order for DENR personnel to be effective in their role as forestry and rural development agents, the communication between the DENR organisation and community members needs to improve dramatically. As well as having more resources for personnel to conduct visits of communities, DENR officers have to be supported with extension materials to suit the information needs of the communities and LGUs. The same extension materials are required even if the LGUs are given the responsibility for managing tree registration. The LGUs will need substantial assistance from the DENR, DA and DAR in the form of training plus other information materials, if they are to undertake responsibility for administering land management regulations. The LGUs require greater financial and personnel resources to have the capacity to undertake the tasks that are currently designated to them under national natural resource management planning.

Lack of formal and open markets for timber also leads to uncertainty about the financial viability of forestry enterprises. This then restricts forestry development to the extent that markets cannot develop, resulting in a circular pattern of cause and effect that will not be resolved without intervention. The stimulation of markets for existing commercial tree growers may be required to allow them to benefit from their investment, and give others the opportunity to assess the viability of expanding their forestry activities. A high proportion of households surveyed indicated an interest in growing trees commercially, with some groups of households already in a position to expand their tree planting activities once they have greater certainty about tenure and can judge the viability of forestry enterprises. Other groups of households would require support in terms of technical assistance, and in some cases financial assistance, before they have the interest in or capacity to increase their tree management activities.

16.7 SUGGESTIONS FOR FURTHER RESEARCH

The typology of rural households in relation to their tree management attitudes and behaviour provides the greater understanding of the prospects for smallholder forestry development in Leyte Province and means by which various households can be assisted to develop forestry activities. The typology is a ‘broad’ picture of the attitudes and tree planting and management practices of rural households. While it does provide the means to target elements of forestry development programs to meet the needs of various types of households, this targeting could be assisted by examination of the decision-making processes and learning styles of the households. Do the various types of households differ in terms of their decision-making processes and learning styles? Studies that investigate the decision making processes of rural households in relation to land management could also investigate the nature of the differences between household types in terms of their attitudes to agriculture and perceptions of agricultures' role in the provision of their livelihood.

The analyses of data gathered for and presented in this thesis are all focused at the household level. Detailed data about the farming systems of the households were gathered at the plot level. Analysis of these data through farming systems studies could aid the identification of commonly practiced indigenous agroforestry systems. This would provide a starting point for biologically based forestry research into plant breeding, plant domestication and silvicultural practices to optimize these systems in a manner that takes account of the livelihood and lifestyle objectives of the household.

Growth of the high quality tree species native to the Philippines in plantation or agroforestry conditions is poorly researched and reported at present and requires urgent attention to build upon the local or indigenous knowledge about these species. The responses to the survey of rural communities and households reported in this thesis revealed that the members of these communities have a strong interest in growing tree species that are native to the Philippines. It would appear that in promoting forestry development in the Philippines, the greatest effort thus far has focused on exotic species and genera including Acacia, Mahogany and Gmelina. Given the alarming rate of forest loss and the time passed since broad-scale legal timber harvesting operations ceased in native forests, knowledge about the characteristics of various native trees is decreasing in rural communities. It is likely that this knowledge will be lost if it is not documented quickly.

It is suggested that other typology studies be conducted in other areas of the Philippines and on other topics related to land management. The lack of studies that have developed typologies of rural households in the Philippines, and lack of comprehensive studies of the socioeconomic factors affecting smallholder tree management practices, means that it is difficult to assess the applicability of the typology developed for this thesis to other communities in Leyte Province and elsewhere in the Philippines. Once other studies are undertaken, comparison of the characteristics of various types of households in this thesis with those described by other studies across the Philippines of rural households in relation to agriculture or poverty alleviation could assist in determining the variability in household's socioeconomic circumstances and livelihood strategies in other regions of the Philippines. It could also help to answer the question of whether there is, as Landais (1998) suggested, a 'master' typology of rural households, through comparison of whether the socioeconomic characteristics of the types defined using criteria other than attitudes are consistent with those of the types described in this thesis

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APPENDIX A

METHODS USED IN THE INITIAL FOCUS GROUP DISCUSSIONS

The set of six activities conducted during the FGD were chosen to meet the above objectives. The activities included:

- community mapping;
- documenting the history of the community;
- compilation of a lists of reasons for and constraints to tree planting and management;
- a SWOT (strengths, weaknesses, opportunities and threats) analysis of the community;
- documenting the typical annual activities of the barangay; and
- compiling of lists of characteristics of various well-being categories of households in the barangay.

In the following sections details of the methods used for each of the activities are presented.

Community mapping

The group was provided with materials to draw a map of their community and a legend to follow when making the map. Materials included a 125 cm by 90 cm sheet of manila paper, crayons, and pencils. The participants were asked to start by marking the boundaries and names of surrounding barangays. They were then asked to mark out the major infrastructure and natural features in the barangay including the roads, barangay hall, churches, rivers, and seashore where applicable. Respondents were then asked to indicate the position of the housing in the barangay and indicate the constructing materials used through shading different construction materials different colors.

Participants were also asked to mark in other important features in the barangay such basketball courts, wells, springs, daycare centre, water systems (faucets) plus the position of various crop growing areas in the barangay. The purpose of the community mapping activity was to encourage the participants to think about the characteristics of their barangay, to obtain a map of the communities (which were not otherwise available), and to obtain a picture of the distribution of households in the barangay that could be used to assist the sampling of households in the structured interviews.

Community history

In discussing the history of the community and tracing its origin, participants were requested to recall the major events that had taken place in their community and the facilitators used a timetable to note these down. Events were listed chronologically on a yearly basis. The responses of the participants were categoriesd into four sets, namely: social, environmental, agricultural and infrastructure development. The community histories helped to provide background information about the communities and assist in the interpretation of the responses to the surveys.

Reasons for and Constraints to Tree Planting and Management Activities

In this section of the FGDs the participants were asked to list the potential reasons for and constraints to tree planting and management activities on land they manage. They were also asked to list the tree species they prefer to grow, and possible products that could be produced from these species.

Strengths, Weaknesses, Opportunities and Threats (SWOT) Analyses

For this activity participants were asked to consider and compile lists of the strengths, weaknesses, opportunities and threats they perceive as affecting the households in the community. Lists were drawn up on sheets of manila paper by one of the two groups in the morning session of the FGDs then presented to all participants for validation in the afternoon sessions.

Documenting the Typical Annual Activities in the Barangays

To carry out this activity the facilitators of the FGDs prepared sheets of manila paper with the months of the year listed down the side and agriculture, social activities and other activities used as column headings to guide the discussions. Participants were asked to describe the activities that typically occurred during each month in these areas of barangay life. Planting and harvest times were recorded for the main crops grown by households in the community and the dates of religious and social activities were also noted.

Characteristics of Households in Various Well-being Classes in the Barangays

In this activity the participants were asked to consider variations in well-being of households and to describe the characteristics of them. To guide the discussions, participants were asked to consider four types of households. These were named the 'very poor', the 'poor', the 'rich' and the 'very rich' households. Lists of the characteristics of these households were developed, including their ownership of resources, their work practices, materials used in household construction, food security, ownership of leisure goods and attitudes to work and education.

APPENDIX B

ACIAR – LSU Household Interview Schedule

Introduction

1. Give potential participants the information about the survey (information sheet)
   Allow time for them to read the information or read it to them and answer any questions

they have about the survey. Refer to the field supervisors if unable to answer questions.

2. Remind the potential participants that their participation is voluntary, and that all information will be confidential and anonymous. They will also be able to cancel their agreement to participate up until November 2002 after the end of the survey in their community. Remind them that all their answers to questions will be removed from the database collected if they later change their minds about participating.

3. If the household agrees to participate, request that they sign a form to formalise their agreement. Mark the interview form with an identification code and copy that code to the agreement form they have signed. *Hand this form to Edwin as soon as possible after completing the interview.*

4. Indicate that the interview will commence from now (i.e. say "*we will now start the interview*").

OR

5. If they indicate that they *do not wish to participate*, thank them for their time and try to arrange an interview at a neighbouring household.

1. Household demographics

1.1 For all members in the household over the age of 12 years please complete table 1.1 below

Table 1.1: Household members

Person no.	**Gender (m / f)**	**Age**	*Main occupation*	**Est'd yearly earning main occup**	**% of time spent in main occupation**	**Education / Training undertaken**				
						Sch/Coll	**Train. 1**	**Train 2**	**Train. 3**	**Train 4**
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										

*for school/college enter highest educational attainment

1.2 How many children in the household (below the age of 12)? ………
If one or more children present then go to 1.3 else go to 1.4

1.3 How many of the children (under 12) attend school? ………

Other livelihood activities

Ask all respondents:

What other livelihood activities are undertaken by members of the household? *Please complete table 1.2 below.*

Table 1.2: Other sources of income

Name of activity *	**H.hold members involved** (use numbers from table 1.1)	*Seasonal* **(Y / N)**	**Location of work**	**Time spent per year (months worked during year)**	**Average time working per week**	**Salary rate**	**Est.d yearly earnings**

*include other sources of income even if not actively involved in daily management e.g. of businesses

1.4 Has your family always lived in the barangay? ………
If yes, then go to 1.5 else go to 1.8

1.5 How long has the household been established in the area? (yrs) …… Your family? ……

1.6 From where did they migrate? (Municipality/province)
………………………………/……………………………………

1.7 Why did the family move to this area?
………………………………………………………………………………………………..
…………………………………………………………………………………………………
…………………………………………………………………………………………………
……………………………………………………………………………………

1.8 Do you have your own transport (e.g. a car or motorbike)? (Y/N) …………
if yes, ask What sort of vehicle(s) is it/are they?
…………………………………………………………………………………………………
…………………………………………………………………………………………………

1.9 What materials is your household constructed from (e.g. light, mixed, concrete)? *State materials if mixed* …………………………………………………...

1.10 Do members of the regularly remit money to the household? (Y / N) ………
If yes then go to 1.11, else go to 2.

1.11 How much do they remit per year on average? …………

2. Land owned/managed by the household

We would like to ask you if your household has land used for farming. Do you own some land? Do you rent land? Do you lease land to others? We would like to ask you about each plot of land in turn, what is growing there this year and your farming practices.

Fill in the table of plots and record details for each plot operated by the household. Ask farmers to indicate plot locations on the community map, mark in boundaries and label each plot on the map with a plot code. Refer to this years activities. Where tree are present, fill in details in the next table (Table 2).

Table 2:1: Plots farmed by the household

Parcel	**Tenure**	**Years owned or leased**	**Parcel size (ha)**	**Slope**	**Distance from house**	**Crops grown in each plot** Sp. Name	% sold	Mrk price	Crop Time	Mrk location	**Source of water**	**Trees present?***

***(P = in plot, B=boundary I=intercropped trees/ agriculture, N = none)**

2.1 *If household leases land, ask* Is there a formal contract for the lease? (Y/N) ………
What conditions are on the lease?
……………………………………………………………………………………………
……………………………………………………………………………………………
…………………………………………………………………………………………

2.2 Does the household own any livestock? (Y/N) ……
If yes, ask Are any of these livestock sold? (Y/N)…….
If yes, ask Approximately how much income is earned per year through livestock sales?………………….

2.3 What proportion of the households' staple food (rice/corn) needs do you grow yourselves? (*circle one*)

0-25% 26-50% 51-75% 76-100%

2.4 What proportion of the households' total food needs do you produce yourselves? (*circle one*)

0-25% 26-50% 51-75% 76-100%

3. Present and intended tree planting and management activities

Ask "Have members of your household planted trees?" (Yes/No) …………
If the household has planted their own trees, then go to3.1: Else go to 3.4:

3.1 What was the source of the seedlings used? (*circle response(s)*)
a. Community nursery?
b. DENR nursery?
c. Collected wildlings?
(*If yes, ask* Did you collect them yourself? (Y / N) …………………………)
d. Own seed collection?
e. Other nursery?
If so, which? ……………………………………………………………………
f. Other? Specify source…………..………………………………………………….

What is your preferred source of seedlings?
………………………………………………….
Why?………………………………………………………………………………
………………………………………………………………………………………

3.2 Was there a choice in the species available to plant? (Yes / No)……………
If yes, ask What species were available?
……………………………………………………………………………………………
……………………………………………………………………………………………

3.3 Did you seek advice before planting? (Yes / No)……………………
If yes then ask From whom did you seek advice? ……………………………..
3.4 Do you intend to plant (some or more) trees on your land in the future? (Yes / no) ………

If yes, fill in table 3.3

3.5 Have you sought advice about tree management or marketing? (Yes / No)………………
If yes then ask From whom did you seek advice? ……………………………...

3.6 Do you know how to register your planted trees with DENR? (Yes/No) …*If no go to 3.7*
If yes then ask Have you registered your planted trees? (Yes/No) ……………
If no, ask Why?……………………………………………………….
………………………………………………………………………………………
………………………………………………………………………………………
3.7 Do you make any products from wood sourced from your land (*inc. construction*)?
If yes then ask What products do you make?

1) ……………………………………………………
2) ……………………………………………………
3) ……………………………………………………
4) ……………………………………………………
5) ……………………………………………………

3.8 Do you use plant materials or animals gathered from public lands? (Y / N)………………
If no then go to 3.9. If yes, complete table 3.1

Table 3.1: Products from public lands

Species used name	If processed (Y / N)	Product name	Months done	Time spent to gather *	Time spent processing *	If sold (If yes, proportion sold, market price per unit)

*time in days per unit

3.9 Do you use materials from public land in the past? (Y/N) ………..

if yes ask, When did you stop?……….

Why?……………………………………………………………………………………
………………………………………………………………………………………
………………………………………………………………………………………
……………………………………..…………………………………………………

For each parcel with trees planted or managed, put details in table below

Table 3.2: Trees planted and managed by the household

Parcel No.	**Species present (common name)**	**Planted or regenerated?**	**No of individuals per species**	**Age of tree species**	**Main functions of trees (for each species) *refer to code***	**Will the trees be harvested for timber /firewood/ charcoal? If yes, when will harvests occur?**				**For timber trees, proportion or number to be sold, what use, market location, price expected**			
						T	F	C	Yrs to hrv*	% sold…	Used for	Mrk place	Price

* DK= Don’t know, DN=Depends on need and Y=Yearly

Table 3.3: Proposed tree planting activities

Parcel no.	**Species proposed (common name)**	**Main functions of trees (for each species)**	**No of indiv. Per sp.s**	**Years to harv.**	**Will the trees be harvested for timber, firewood or charcoal? If yes, when will harvests occur?**		**For timber trees, proportion or number to be sold, what use, market location, price expected**			
					Yes/no(T or F)	Yrs to hrv	% sold…	Used for	Mrk place	Price

3.10 Are you interested in tree farming for commercial purposes? (Y/N) ……………….

3.11 How important do you rate the following reasons for planting and managing trees on your land?

Reason	Not important	Slightly important	Moderately important	Quite important	Very important
1. To provide shade for crops					
2. To benefit future generations					
3. To improve soil fertility					
4. To provide construction materials					
5. To protect the soil and prevent landslides					
6. To improve the water supply volume					
7. Because of a personal interest in trees					
8. To provide material for charcoal making					
9. To improve the natural forest quality					
10.To provide firewood					
11. To improve water quality					
12. To produce timber/lumber for sale					
13. Other (specify)					

Which three of the above reasons for planting are the most important to you? ……………………
Why?………..……………………………………
…………………………………………………………

3.12 How important do you rate the following constraints for planting and managing trees on your land?

Constraint	Not important	Slightly important	Moderately important	Quite important	Very important
1. Risk of damage to trees by grazing animals					
2. Availability of seedlings or seeds					
3. Knowledge about tree planting and management					
4. Finances to pay for tree growing needs					
5. Policies relating to tree harvesting					
6. Difficulties marketing wood products					
7. Availability of land to plant					
8. Lack of labour to tend trees					
9. Potential damage to trees from typhoons					
10. Time taken for trees to grow					
11. Risk of fire damage of trees					
12. Risk of officials charging fees for harvest					
13. Lack of access to community organisations					
14. Concern about security of tenure					
15. Competition between trees and crops					
16. Other (specify)					

Which three of the above constraints to planting are the most important to you?
…………………
Why?……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
…………………………

4. Community organisations and forestry

4.1 Has the household ever been a member of a community organization? (Y / N) ………
If no go to 4.4 else ask Which organisations do or have you belonged to?

Name of organisation	Family members involved	Time period of membership	Positions held

If no longer members, ask why they quit
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
………………………

4.2 What are the advantages of being a member of the community organization?
……………………………………………………………………………………
………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
………………………………

4.3 What are the disadvantages of being a member of the community organization?
……………………………………………………………………………………
……
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
………………………………

Go to 4.5

4.4 Why is no one in the household a member of the community organization?
……………………………………………………………………………………

……………………………………………………………………………………
……………………………………………………………………………………
………………………………

4.5 Have members of the household ever been involved with community forestry projects? (Y / N) ………

if yes ask What was/is your involvement in the project?

……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
……………………………………………………………………………………
………………………………

4.6 What are the advantages of community forestry projects?

………………………………………………………………………………………………

……………………………………………………………………………………………
……………………………………………………………………………………………
……………………………………………………………………………………………
………………………

4.7 What are the disadvantages of community forestry projects?

……………………………………………………………………………………………
……………………………………………………………………………………………
……………………………………………………………………………………………
………………………

4.8 What needs to be developed in the barangay?

……………………………………………………………………………………………
……………………………………………………………………………………………
……………………………………………………………………………………………
………………………

4.9 What are the urgent ecological problems in the barangay?

……………………………………………………………………………………………
……………………………………………………………………………………………
……………………………………………………………………………………………
………………………

4.10 Preferences for development projects

If a government agency or NGO had limited funds available to support a single development project in the barangay, how would you rank the following project options to use the funds?

Ask respondents to rank options from 1 *to* 5 *in terms of their preferences with 1 the most preferred and 5 the least preferred*

… Community organizing (e.g. establish co-operatives, develop business skills, leadership training)
… Agricultural training programs (e.g. introduction of new farming methods, new crop varieties)
… Transportation facilities improvement (e.g. road improvement)
… Agriculture infrastructure development (e.g. post harvest facilities, irrigation expansion)
… Education infrastructure improvement (e.g. build or develop school facilities)
… Communications development (e.g. provision of improved telephone reception)
… Community forestry program (e.g. community tree farming project)
… Small-scale business development (e.g. seminars and other training to support small-business establishment)
… Health services development (e.g. provision of or expansion of local health services, expanded potable water supply)

Appendix C

SUMMARY OF STATISTICAL TESTS BETWEEN HOUSEHOLDS SOCIOECONOMIC VARIABLES AND VARIABLES MEASURING PRESENT AND INTENDED TREE MANAGEMENT BEHAVIOUR

Table 1: Chi Square tests between ‘if planted’ and socioeconomic categorical variables

Variable	d.f.	Pearsons Chi Square	Probability
Community	3	7.733	0.052*
Proportion of staple food grown	3	4.667	0.198
Proportion of total food grown	3	5.272	0.153
If have children in household	1	0.070	0.791
If household member has done some training	1	0.515	0.473
If family has always lived in barangay	1	1.868	0.172
If have own transport	1	1.233	0.267
House construction materials	2	2.832	0.243
Family remit money	1	2.605	0.107
Cropping types	5	30.391	0.000**
If livestock sold	1	0.507	0.477
If livestock owned	1	0.008	0.929
If use materials from public lands	1	0.000	0.983
Used resources from public land in the past	1	2.942	0.086*
Reason stopped using public land	4	2.208	0.698
Know how to register trees	1	0.225	0.636
Interested in commercial tree farming	1	0.807	0.369
If ever been member of a community organisation	1	4.288	0.038**
Highest education category	2	1.062	0.588
If ever participated in a community forestry program	1	0.859	0.354
If have own land	1	4.413	0.036**
Presently growing timber for sale	1	5.788	0.016**
If have own rice land	1	0.552	0.867
Intend to plant trees	1	5.882	0.015
Number of farming plots used 2	3	9.113	0.028**
Intend to plant for timber	1	0.335	0.563
Community development needs	8	11.431	0.178

Table 2: One way AVOVA tests between 'if planted' and socioeconomic variables

Variable	Sum of Squares	df	Mean Square	F	Sig.
Number of people in the household	3.887342	1	3.887	0.764	0.383
Household gross yearly income	0.301137	1	0.301	1.650	0.201
Average income of each household member	0.215131	1	0.215	0.860	0.355
Ratio of working adults to children	0.043636	1	0.044	0.093	0.760
Time family lived in barangay	16.30793	1	16.308	0.024	0.876
Time household established in barangay	238.7991	1	238.799	0.763	0.385
Family remit money	0.621975	1	0.622	2.613	0.108
Remitance amount average per year	0.094873	1	0.095	0.199	0.657
Livestock income	0.607374	1	0.607	2.014	0.160
Year stopped using public lands 2	19.73704	1	19.737	0.237	0.628
Proportion of farm land owned	0.528496	1	0.528	2.750	0.099*
Size of owned land	0.481716	1	0.482	2.470	0.119
Size of all household land	0.838813	1	0.839	3.737	0.055*
Farming income total	0.021661	1	0.022	0.099	0.754
Proportion of income from farming	0.490491	1	0.490	2.244	0.136
Total trees planted or managed	1.448076	1	1.448	2.373	0.125
Total trees intended to plant	0.268324	1	0.268	0.290	0.591
Number of trees planned to be sold	0	1	0	0	1
No of trees intended to harvest for timber	0.119546	1	0.120	0.256	0.616
Total distance to farm plots	0.180994	1	0.181	0.698	0.404
Average distance to farm plots	0.022804	1	0.023	0.104	0.747
Number of children below 12	2.734848	1	2.735	1.217	0.271
Number of children below 12 at school	0.851289	1	0.851	0.741	0.390
Number of children below 12 not at school	1.200789	1	1.201	1.207	0.273
Number of farming plots used 2	2.738952	1	2.739	4.022	0.046*

Table 3: Chi Square tests between 'Total tree planted categories' and socioeconomic categorical variables

Variable	d.f.	Pearsons Chi Square	Probability
Community	9	20.392	0.016
Proportion of staple food grown	9	12.546	0.184
Proportion of total food grown	9	3.430	0.945
If have children in household	3	0.930	0.818
If household member has done some training	3	0.878	0.831
If family has always lived in barangay	3	3.525	0.318
If have own transport	3	3.622	0.305
House construction materials	6	13.693	0.033**
Family remit money	3	1.958	0.581
Cropping types (33.3% of cells less than 5)	15	41.690	0.000
If livestock sold	3	8.838	0.032**
If livestock owned	3	3.112	0.375
If use materials from public lands	3	4.977	0.173
Used resources from public land in the past	3	3.608	0.307
Reason stopped using public land	12	11.710	0.469
Know how to register trees	3	0.750	0.861
Have registered trees (50% cells less than 5)	3	11.647	0.009
Interested in commercial tree farming	3	2.388	0.496
If ever been member of a community organisation	3	2.834	0.418
If ever participated in a community forestry program	3	0.635	0.888
If have own land	3	9.004	0.029**
If have own rice land	3	4.925	0.177
If have any rice land	3	2.375	0.498
Intend to plant trees	3	8.446	0.038**
Highest education category	6	2.379	0.882
If presently growing timber for sale	3	9.100	0.028**
Intend to plant for timber	3	2.077	0.557
Community development needs	24	42.542	0.011
Number of farm parcels used	9	28.515	0.001

Table 4: One way AVOVA tests between total tree planting categories and socioeconomic variables

Variable	Sum of Squares	df	Mean Square	F	Sig.
Number of people in the household	27.89388	3	9.298	1.852	0.139
Household gross yearly income	0.952	3	0.317	1.752	0.158
Average income of each household member	1.152129	3	0.384	1.550	0.203
Ratio of working adults to children	0.489837	3	0.163	0.347	0.792
Time family lived in barangay	1618.215	3	539.405	0.812	0.492
Time household established in barangay	178.4791	3	59.493	0.185	0.907
Remittance amount average per year	0.898878	3	0.300	0.625	0.601
Livestock income	0.460965	3	0.154	0.492	0.689
Year stopped using public lands 2	270.5103	3	90.170	1.107	0.355
Proportion of farm land owned	0.955973	3	0.319	1.660	0.177
Size of owned land	1.588648	3	0.530	2.811	0.043
Size of all household land	6.367	3	2.122	10.732	0.000
Farming income total	0.379	3	0.126	0.576	0.632
Proportion of income from farming	0.346	3	0.115	0.520	0.669
Total trees planted or managed	79.82648	2	39.913	313.923	0.000
Total trees intended to plant	5.434787	3	1.812	2.031	0.114
Number of trees planned to be sold	2.201129	1	2.201	8.467	0.023
No of trees intended to harvest for timber	0.744191	3	0.248	0.522	0.670
Total distance to farm plots	1.658306	3	0.553	2.178	0.092
Average distance to farm plots	1.045415	3	0.348	1.618	0.187
Number of children below 12	6.046	3	2.015	0.894	0.445
Number of children below 12 at school	2.63946	3	0.880	0.764	0.515
Number of children below 12 not at school	1.591393	3	0.530	0.529	0.663
Number of farming plots used	10.19419	3	3.398	3.447	0.018

Table 5: One way AVOVA tests between ‘total trees currently managed per household’ and socioeconomic variables

Variable	Sum of Squares	df	Mean Square	F	Sig.
Community	7.518	3	2.506	4.322	0.006**
Proportion of staple food grown	7.455	3	2.485	4.283	0.006**
Proportion of total food grown	1.213	3	.404	.653	0.582
Household age categories	2.265	3	.755	1.232	0.300
If have children in household	1.242	1	1.242	2.031	0.156
If hsehold member has done some training	.436	1	.436	.707	0.402
If hsehold member has done any agriculture training	.299	1	.299	.484	0.488
If hsehold member has done any community forestry training	.225	1	.225	.364	0.547
If hsehold member has done any community leadership training	5.476E-04	1	5.476E-04	.001	0.976
If hsehold member has done any cooperative training	6.202E-04	1	6.202E-04	.001	0.975
If family has always lived in barangay	5.018E-02	1	5.018E-02	.081	0.776
If have own transport	2.839	1	2.839	4.719	0.031*
House construction materials	2.664	2	1.332	2.196	0.115
Family remit money	.212	1	.212	.343	0.559
Cropping types	6.566	4	1.642	2.785	0.0298
If sell livestock	4.046	1	4.046	6.918	0.009*
If own livestock	2.833	1	2.833	4.680	0.032**
Cluster group	1.217	3	.406	.696	0.556
If use materials from public lands	2.089	1	2.089	3.413	0.067*
Used resources from public land in the past	.580	1	.580	.943	0.333
Reason stopped using public land	8.708E-02	4	2.177E-02	.045	0.996
Know how to register trees	.778	1	.778	1.252	0.265
Have registered trees	1.450E-02	1	1.450E-02	.024	0.876
Interested in commercial tree farming	.915	1	.915	1.492	0.224
If ever been member of a community organisation	.373	1	.373	.630	0.428
If ever participated in a community forestry program	.861	1	.861	1.490	0.224
If have own land	1.883	1	1.883	3.100	0.080*
If have own rice land	3.248	1	3.248	5.422	0.021*
If have any rice land	6.189E-05	1	6.189E-05	.000	0.992
If intend to plant trees	4.210	1	4.210	7.070	0.009**
Poverty threshold (official)	.540	1	.540	.877	0.350
Highest education category	.294	2	.147	.236	0.790
Presently growing timber for sale	7.522	1	7.522	13.135	0.000**
Community development needs	5.064	8	.633	1.098	0.368
Number of farm parcels used	4.433	3	1.478	2.466	0.064*

Table 6: Intend to plant by categorical socioeconomic variables

Variable	d.f.	Pearsons Chi Square	Probability
Community	3	8.968	0.030**
Proportion of staple food grown	3	8.346	0.039**
Proportion of total food grown (linear p = 0.050)	3	4.453	0.217
If have children in household	1	0.811	0.368
If household member has done some training	1	0.029	0.864
If household member has done any agriculture training	1	0.009	0.926
If household member has done any community forestry training	1	0.142	0.706
If household member has done any community leadership training	1	0.301	0.583
If household member has done any cooperative training	1	0.205	0.651
If family has always lived in barangay	1	1.224	0.268
If have own transport	1	2.672	0.102
House construction materials	2	0.612	0.737
Family remit money	1	0.014	0.905
Cropping types	5	18.611	0.002**
If livestock sold	1	1.523	0.217
If livestock owned	1	0.537	0.468
If use materials from public lands	1	3.682	0.055*
Used resources from public land in the past	1	2.999	0.083*
Reason stopped using public land	4	4.394	0.355
Know how to register trees	1	3.811	0.051*
Have registered trees	1	0.052	0.820
Interested in commercial tree farming	1	47.841	0.000**
If ever been member of a community organisation	1	14.379	0.000**
Highest education category	2	6.406	0.041**
If ever participated in a community forestry program	1	3.568	0.059*
If have own land	1	5.694	0.017**
If have own rice land	1	2.672	
If have any rice land	1	2.213	0.137
If planted trees	1	5.882	0.015**
If presently growing timber for sale	1	7.211	0.007**
Intend to plant for timber	1	12.828	0.000**
Tree planting categories	3	8.446	0.038**
Community development needs	8	7.077	0.528
Number of farm parcels used	3	18.776	0.000**

Table 7: One way ANOVA tests between 'intend to plant' and socioeconomic variables

Variable	Sum of Squares	df	Mean Square	F	Sig.
Number of people in the household	5.298013	1	5.298	1.055	0.306
Household gross yearly income	1.10552	1	1.106	6.152	0.014**
Average income of each household member	0.605871	1	0.606	2.465	0.118
Ratio of working adults to children	0.469999	1	0.470	1.007	0.318
Time family lived in barangay	621.8701	1	621.870	0.907	0.344
Time household established in barangay	11.3534	1	11.353	0.036	0.850
Family remit money	0.003407	1	0.003	0.014	0.906
Remitance amount average per year	0.103782	1	0.104	0.216	0.643
Livestock income	0.020727	1	0.021	0.067	0.797
Year stopped using public lands 2	22.05334	1	22.053	0.265	0.609
Proportion of farm land owned	1.021977	1	1.022	5.405	0.021**
Size of owned land	43.21514	1	43.215	3.795	0.053*
Size of all household land	1.158522	1	1.159	5.123	0.025**
Farming income total	0.210679	1	0.211	0.958	0.329
Proportion of income from farming	0.098491	1	0.098	0.449	0.504
Total trees planted or managed	4.20996	1	4.210	7.070	0.009**
Total trees intended to plant	1.663759	1	1.664	1.832	0.179
Number of trees planned to be sold	0	1	0	0	1
No of trees intended to harvest for timber	0.015519	1	0.016	0.033	0.857
Total distance to farm plots	0.224235	1	0.224	0.881	0.349
Average distance to farm plots	0.041323	1	0.041	0.195	0.659
Number of children below 12	0.299691	1	0.300	0.132	0.717
Number of children below 12 at school	0.028369	1	0.028	0.024	0.876
Number of children below 12 not at school	0.093949	1	0.094	0.093	0.761
Number of farming plots used	13.00566	1	13.006	20.576	0.000**

Table 8: One way AVOVA tests between 'total trees intended to plant per household' and socioeconomic variables

Variable	Sum of Squares	df	Mean Square	F	Sig.
Community	4.829	3	1.610	1.793	0.153
Number of people in hsehold	9.253	10	0.925	1.009	0.442
Proportion of staple food grown	4.056	3	1.352	1.493	0.221
Proportion of total food grown	11.633	3	3.878	4.665	0.004**
Household age categories	3.901	3	1.300	1.434	0.237
If have children in household	.264	1	.264	.285	0.594
If hsehold member has done some training	1.071	1	1.071	1.169	0.282
If hsehold member has done any agriculture training	.965	1	.965	1.052	0.307
If hsehold member has done any community forestry training	1.393	1	1.393	1.525	0.220
If hsehold member has done any community leadership training	.287	1	.287	.310	0.579
If hsehold member has done any cooperative training	1.518	1	1.518	1.663	0.200
If family has always lived in barangay	.203	1	.203	.220	0.640
If have own transport	8.678E-02	1	8.678E-02	.094	0.760
House construction materials	3.545	2	1.773	1.966	0.145
Family remit money	3.110	1	3.110	3.466	0.065
Cropping types	4.640	4	1.160	1.276	0.284
Cluster group	11.525	3	3.842	4.571	0.005**
If use materials from public lands	9.795	1	9.795	11.726	0.001**
Used resources from public land in the past	6.410	1	6.410	7.694	0.007**
Reason stopped using public land	8.759	4	2.190	1.925	0.129
Know how to register trees	6.582E-03	1	6.582E-03	.007	0.933
Have registered trees	7.350E-02	1	7.350E-02	.082	0.776
Interested in commercial tree farming	.212	1	.212	.229	0.633
If ever been member of a community organisation	.730	1	.730	.793	0.375
If ever participated in a community forestry program	1.145	1	1.145	1.270	0.262
If have own land	1.299	1	1.299	1.420	0.236
If have own rice land	1.399	1	1.399	1.531	0.219
If have any rice land	3.809	1	3.809	4.277	0.041**
If planted trees	.268	1	.268	.290	0.591
Poverty threshold (official)	.123	1	.123	.132	0.717
Highest education category	.930	2	.465	.502	0.607
Presently growing timber for sale	.393	1	.393	.425	0.516
Community development needs	9.466	8	1.183	1.266	0.271
Number of farm parcels used	3.329	5	.666	.715	0.613

Table 9: Intend to plant for timber by categorical socioeconomic variables

Variable	d.f.	Pearsons Chi Square	Probability
Community	3	8.946	0.030**
Proportion of staple food grown	3	6.072	0.108
Proportion of total food grown	3	6.647	0.084*
Household age categories	3	7.484	0.058*
If have children in household	1	0.829	0.363
If household member has done some training	1	3.327	0.068**
If household member has done any agriculture training	1	0.763	0.382
If household member has done any community forestry training	1	0.021	0.885
If household member has done any community leadership training	1	0.051	0.821
If household member has done any cooperative training	1	2.074	0.150
If family has always lived in barangay	1	7.892	0.005**
If have own transport	1	1.568	0.210
House construction materials	2	0.103	0.950
Family remit money	1	2.635	0.105
Cropping types	5	3.390	0.640
If livestock sold	1	0.057	0.812
Type transport owned (many have boats)	6	6.740	0.346
If use materials from public lands	1	12.108	0.001**
Used resources from public land in the past	1	4.361	0.037**
Reason stopped using public land (more awareness of illegality	4	3.127	0.537
Know how to register trees	1	3.524	0.060*
Have registered trees	1	1.386	0.239
Interested in commercial tree farming	1	30.164	0.000**
If ever been member of a community organisation	1	14.112	0.000**
If ever participated in a community forestry program	1	12.314	0.000**
If have own land	1	3.668	0.055**
If have own rice land	1	0.087	0.457
If have any rice land	1	3.614	0.057**
If planted trees	1	0.335	0.563
Number of planted trees categories	3	2.077	0.577
Highest education category	2	.737	0.692
Presently growing timber for sale	1	14.346	0.000**
Intend to plant trees	1	12.828	0.000**
Community development needs	8	15.046	0.058**
Number of farm parcels used	3	5.685	0.100

Table 10: One way ANOVA tests between 'intend to plant for timber' and socioeconomic variables

Variable	Sum of Squares	df	Mean Square	F	Sig.
Number of people in the household	1.780742	1	1.781	0.349	0.555
Household gross yearly income	0.261409	1	0.261	1.430	0.233
Average income of each household member	0.336527	1	0.337	1.349	0.247
Ratio of working adults to children	2.403511	1	2.404	5.347	0.022
Time family lived in barangay	8166.78	1	8166.780	14.850	0.000
Time household established in barangay	1563.853	1	1563.853	5.299	0.024
Remittance amount average per year	0.024203	1	0.024	0.051	0.823
Livestock income	0.727854	1	0.728	2.427	0.124
Year stopped using public lands 2	308.7275	1	308.728	3.980	0.051
Proportion of farm land owned	1.007553	1	1.008	5.309	0.022
Size of owned land	0.559304	1	0.559	2.879	0.093
Size of all household land	0.664843	1	0.665	2.950	0.087
Farming income total	0.089807	1	0.090	0.411	0.523
Proportion of income from farming	0.201436	1	0.201	0.915	0.340
Total trees planted or managed	0.202336	1	0.202	0.327	0.568
Total trees intended to plant	0.482306	1	0.482	0.523	0.471
Number of trees planned to be sold	2.206175	1	2.206	8.511	0.022
No of trees intended to harvest for timber	0	1	0	0	1
Total distance to farm plots	1.144	1	1.144	4.506	0.035
Average distance to farm plots	0.818774	1	0.819	3.823	0.052
Number of children below 12	0.232894	1	0.233	0.103	0.749
Number of children below 12 at school	7.100252	1	7.100	6.366	0.012
Number of children below 12 not at school	4.99748	1	4.997	5.128	0.025
Number of farming plots used 2	0.956708	1	0.957	1.387	0.240

Table 11: If presently growing timber for sale by categorical socio economic variables

Variable	d.f.	Pearsons Chi Square	Probability
Community	3	3.141	0.370
Proportion of staple food grown	3	2.739	0.434
Proportion of total food grown	3	0.962	0.810
Household age categories	3	6.464	0.091*
Highest education category	2	13.468	0.001
If have children in household	1	1.199	0.274
If household member has done some training	1	0.044	0.834
If household member has done any agriculture training	1	0.009	0.924
If household member has done any community forestry training	1	0.063	0.802
If household member has done any community leadership training	1	0.202	0.653
If household member has done any cooperative training	1	0.323	0.570
If family has always lived in barangay	1	0.007	0.934
If have own transport	1	11.306	0.001**
House construction materials	2	0.447	0.800
Family remit money	1	2.259	0.133
Cropping types	5	4.167	0.526
If livestock sold	1	3.946	0.047
If livestock owned	1	1.560	0.212
If use materials from public lands	1	1.699	0.192
Used resources from public land in the past	1	5.425	0.020**
Reason stopped using public land	4	2.585	0.629
Know how to register trees	1	12.375	0.002**
Have registered trees	1	6.886	0.009**
Interested in commercial tree farming	1	7.761	0.005**
If ever been member of a community organisation	1	10.280	0.001**
If ever participated in a community forestry program	1	7.751	0.005**
If have own land	1	1.498	0.221
If have own rice land	1	0.683	0.409
If have any rice land	1	0.345	0.557
If planted trees	1	5.788	0.016**
Number of planted trees categories	3	9.100	0.028**
Intend to plant for timber	1	14.346	0.000**
Intend to plant trees	1	7.211	0.007**
Community development needs	8	6.460	0.596
Number of farm parcels used	3	9.035	0.027**

Table 12: One way ANOVA tests between 'if presently growing timber for sale' by socioeconomic variables

Presently growing timber	Sum of Squares	df	Mean Square	F	Sig.
Number of people in the household	0.027523	1	0.028	0.005	0.942
Household gross yearly income	1.215737	1	1.216	6.832	0.010**
Average income of each household member	1.341687	1	1.342	5.490	0.020**
Ratio of working adults to children	0.118632	1	0.119	0.254	0.615
Time family lived in barangay	332.4361	1	332.436	0.501	0.481
Time household established in barangay	940.3974	1	940.397	3.099	0.082*
Family remit money	0.5393	1	0.539	2.261	0.134
Remittance amount average per year	1.875004	1	1.875	4.136	0.046**
Livestock income	0.042395	1	0.042	0.137	0.712
Year stopped using public lands 2	12.89259	1	12.893	0.155	0.696
Proportion of farm land owned	0.095449	1	0.095	0.491	0.484
Size of owned land	3.107425	1	3.107	18.159	0.000**
Size of all household land	4.334219	1	4.334	21.013	0.000**
Farming income total	1.002738	1	1.003	4.694	0.032**
Proportion of income from farming	0.160006	1	0.160	0.726	0.395
Total trees planted or managed	7.522098	1	7.522	13.135	0.000**
Total trees intended to plant	0.392762	1	0.393	0.425	0.516
Number of trees planned to be sold	0	1	0	0	1
No of trees intended to harvest for timber	0.003186	1	0.003	0.007	0.935
Total distance to farm plots	2.437809	1	2.438	9.882	0.002**
Average distance to farm plots	0.841834	1	0.842	3.933	0.049**
Number of children below 12	0.955682	1	0.956	0.423	0.516
Number of children below 12 at school	0.059676	1	0.060	0.052	0.820
Number of children under 12 not at school	0.169006	1	0.169	0.169	0.682
Number of farming plots used 2	6.169589	1	6.170	9.293	0.003**

Table 13: Participated in a community forestry program by categorical socioeconomic variables

Independent variable	d.f.	Pearsons Chi Square	Probability
Community	3	5.061	0.167
Proportion of staple food grown	3	1.409	0.703
Proportion of total food grown	3	3.352	0.341
If have children in household	1	0.012	0.913
If household member has done some training	1	1.882	0.170
If household member has done any agriculture training	1	2.153	0.142
If household member has done any community forestry training	1	0.002	0.545
If household member has done any community leadership training	1	1.606	0.205
If household member has done any cooperative training	1	1.284	0.257
If family has always lived in barangay	1	0.675	0.411
If have own transport	1	0.053	0.818
House construction materials	2	1.141	0.565
Family remit money	1	0.002	0.965
Cropping types (nearly all those with no land or veges only)	5	1.177	0.947
If livestock sold	1	2.015	0.156
Type transport owned ()	6	4.653	0.589
If use materials from public lands	1	4.448	0.035**
Used resources from public land in the past	1	0.823	0.364
Reason stopped using public land (more awareness of illegality	4	6.732	0.151
Know how to register trees	1	4.566	0.033**
Have registered trees (3 out of 4 who have registered have participated in comm. For projects)	1	2.354	0.125
Interested in commercial tree farming	1	9.065	0.003**
If ever been member of a community organisation	1	54.172	0.000**
If intend to plant for timber	1	12.314	0.000**
If have own land	1	1.610	0.204
If have own rice land	1	0.093	0.760
If have any rice land	1	0.019	0.889
If planted trees	1	0.859	0.354
Number of planted trees categories	3	0.635	0.888
Presently growing timber for sale	1	7.751	0.005**
Intend to plant trees for timber	1	12.314	0.000**
Intend to plant trees	1	3.568	0.059**
Community development needs	8	13.672	0.091*
Number of farm parcels used	3	7.563	0.052*

Note: the tests between number of children and number of children not at school were significant

Table 14: One way ANOVA tests between 'participated in community forestry project' by socioeconomic variables

	Sum of Squares	df	Mean Square	F	Sig.
Number of people in the household	3.024811	1	3.025	0.595	0.441
Household gross yearly income	0.117923	1	0.118	0.701	0.404
Average income of each household member	0.145953	1	0.146	0.631	0.428
Ratio of working adults to children	0.6060577	1	0.606	1.308	0.255
Time family lived in barangay	29.624597	1	29.625	0.043	0.836
Time household established in barangay	81.304555	1	81.305	0.253	0.617
Remittance amount average per year	0.2121460	1	0.212	0.432	0.513
Livestock income	0.2121935	1	0.212	0.743	0.392
Year stopped using public lands	363.7436	1	363.744	4.681	0.035
Proportion of farm land owned	0.0004964	1	0.000	0.003	0.960
Size of owned land	0.365161	1	0.365	1.879	0.173
Size of all household land	0.91176	1	0.912	4.163	0.043
Farming income total	0.041697	1	0.042	0.195	0.659
Proportion of income from farming	0.142045	1	0.142	0.649	0.421
Total trees planted or managed	0.860959	1	0.861	1.49	0.224
Total trees intended to plant	1.144973	1	1.145	1.27	0.262
Number of trees planned to be sold	1.3625536	1	1.363	3.223	0.123
No of trees intended to harvest for timber	5.638E-05	1	0.000	0.000	0.991
Total distance to farm plots	0.590206	1	0.59	2.276	0.133
Average distance to farm plots	0.062469	1	0.062	0.279	0.598
Number of farming plots used	4.5084307	1	4.508	6.759	0.010
Number of children below 12	15.248879	1	15.249	6.840	0.010
Number of children below 12 at school	0.8855134	1	0.886	0.760	0.384
Number of children below 12 not at school	8.650742	1	8.651	9.237	0.003

Table 15: Interest in commercial tree farming by categorical socioeconomic variables

Independent variable	d.f.	Pearsons Chi Square	Probability
Community	3	4.815	0.186
Proportion of staple food grown	3	4.557	0.207
Proportion of total food grown	3	3.494	0.322
If have children in household	1	0.638	0.424
If household member has done some training	1	0.005	0.941
If household member has done any agriculture training	1	1.311	0.252
If household member has done any community forestry training	1	2.992	0.084*
If household member has done any community leadership training	1	0.694	0.405
If household member has done any cooperative training	1	0.326	0.568
If family has always lived in barangay	1	0.019	0.891
If have own transport	1	1.257	0.262
House construction materials	2	2.586	0.274
Family remit money	1	0.482	0.487
Cropping types ()	5	10.404	0.065*
If livestock sold	1	1.180	0.277
Type transport owned ()	6	3.505	0.743
If use materials from public lands	1	10.187	0.001**
Used resources from public land in the past	1	16.317	0.000**
Reason stopped using public land	4	2.860	0.581
Know how to register trees	1	5.647	0.017**
Have registered trees (all four that have registered are interested)	1	2.427	0.152
If participated in community forestry program	1	9.065	0.003**
If ever been member of a community organisation	1	12.177	0.000**
If intend to plant for timber	1		
If have own land	1	0.895	0.344
If have own rice land	1	0.553	0.457
If have any rice land	1	0.770	0.380
If planted trees	1	0.807	0.369
Number of planted trees categories	3	2.388	0.496
Presently growing timber for sale	1	7.761	0.005**
Intend to plant trees for timber	1	30.164	0.000**
Intend to plant trees	1	47.841	0.000**
Community development needs	8	5.054	0.752
Number of farm parcels used	3	7.594	0.102

Table 16: One way ANOVA tests between ‘interest in commercial tree farming’ by socioeconomic variables

	Sum of Squares	df	Mean Square	F	Sig.
Number of people in the household	0.098126	1	0.098	0.019	0.890
Household gross yearly income	0.384843	1	0.385	2.102	0.149
Average income of each household member	0.399836	1	0.400	1.596	0.208
Ratio of working adults to children	0.735305	1	0.735	1.585	0.210
Time family lived in barangay	71.1567	1	71.157	0.104	0.748
Time household established in barangay	20.85358	1	20.854	0.065	0.800
Remittance amount average per year	0.235281	1	0.235	0.489	0.487
Livestock income	0.04708	1	0.047	0.150	0.699
Year stopped using public lands 2	82.3491	1	82.349	0.989	0.325
Proportion of farm land owned	0.802115	1	0.802	4.198	0.042
Size of owned land	0.571729	1	0.572	3.096	0.081
Size of all household land	0.329762	1	0.330	1.495	0.223
Farming income total	0.016089	1	0.016	0.073	0.787
Proportion of income from farming	0.179346	1	0.179	0.815	0.368
Total trees planted or managed	0.91526	1	0.915	1.492	0.224
Total trees intended to plant	0.211742	1	0.212	0.229	0.633
Number of trees planned to be sold	1.444308	1	1.444	3.924	0.088
No of trees intended to harvest for timber	0.012513	1	0.013	0.027	0.870
Total distance to farm plots	1.283083	1	1.283	5.077	0.025
Average distance to farm plots	0.863908	1	0.864	4.028	0.046
Number of children under 12	1.18765	1	1.188	0.525	0.470
Number of children under 12 at school	0.000895	1	0.001	0.001	0.978
Number of children under 12 not at school	1.505088	1	1.505	1.512	0.220
Number of farming plots used 2	4.15021	1	4.150	4.125	0.044

Table 17: Chi Square tests between 'cluster groups' and socioeconomic categorical variables

Independent variable	Pearsons Chi Square	d.f.	Probability
Community	23.531(a)	9	0.005**
Proportion of staple food grown	14.116(a)	9	0.118
Proportion of total food grown	30.194(a)	9	0.000**
If have children in household	2.202(a)	3	0.532
Household age structure	2.903(a)	9	0.968
If household member has done some training	4.435(a)	3	0.218
Highest education category	1.716	6	0.944
If family has always lived in barangay	2.031(a)	3	0.566
If have own transport	5.599(a)	3	0.133
House construction materials	16.291(a)	6	0.012**
Family remit money	3.443(a)	3	0.328
Cropping types	3.443(a)	3	0.328
If livestock sold	5.900(a)	3	0.117
If livestock owned	.543(a)	3	0.909
If use materials from public lands	34.581(a)	3	0.000**
Used resources from public land in the past	24.179(a)	3	0.000**
Reason stopped using public land	29.730(a)	12	0.003**
Know how to register trees	10.574(a)	3	0.014**
Interested in commercial tree farming	14.844(a)	3	0.002**
If ever been member of a community organisation	9.019(a)	3	0.029**
If ever participated in a community forestry program	5.790(a)	3	0.122
If have own land	9.801(a)	3	0.02**
Presently growing timber for sale	5.126(a)	3	0.163
If have own rice land	2.433(a)	3	0.487
Intend to plant trees	9.157(a)	3	0.027**
Number of farming plots used 2	8.149(a)	9	0.519
Intend to plant for timber	11.449(a)	3	0.01**
Community development needs	30.358(a)	24	0.173
If planted trees	6.610(a)	3	0.085*

Table 18: One way AVOVA tests between cluster groups and socioeconomic variables

	Sum of Squares	df	Mean Square	F	Sig.
Number of people in the household	17.924	3	5.975	1.182	0.318
Household gross yearly income	1.648	3	0.549	3.069	0.029
Average income of each household member	1.499	3	0.5	2.052	0.108
Ratio of working adults to children	1.055	3	0.352	0.749	0.525
Time family lived in barangay	6431.922	3	2143.974	3.514	0.020
Time household established in barangay	1093.224	3	364.408	1.14	0.339
Family remit money					
Remitance amount average per year	7.084	3	2.361	6.093	0.001
Livestock income	0.942	3	0.314	1.021	0.389
Year stopped using public lands 2	204.2909	3	68.097	0.806	0.497
Proportion of farm land owned	0.981428	3	0.327	1.729	0.163
Size of owned land	0.405	3	0.135	0.742	0.53
Size of all household land	1.138	3	0.379	1.738	0.161
Farming income total	0.354	3	0.118	0.532	0.661
Proportion of income from farming	0.978	3	0.326	2.826	0.04
Total trees planted or managed	1.217	3	0.406	0.696	0.556
Total trees intended to plant	11.525	3	3.842	4.571	0.005
Number of trees planned to be sold	1.736	3	0.579	2.047	0.250
No of trees intended to harvest for timber	0.694	3	0.231	0.486	0.694
Total distance to farm plots	1.776	3	0.592	2.315	0.078
Average distance to farm plots	0.698	3	0.233	1.052	0.371
Number of children below 12	7.445	3	2.482	1.109	0.347
Number of children below 12 at school	6.612	3	2.204	1.957	0.122
Number of children below 12 not at school	1.756	3	0.585	0.58	0.629
Number of farming plots used 2					

Appendix D

ACIAR UQ – LSU Smallholder Forestry Project Community Survey Policy Workshop Proceedings

1. PRESENTATION OF THE FINDINGS FROM THE COMMUNITY SURVEYS

The presentation of the findings from the survey was made by Mr Nick Emtage, study leader of the survey and PhD candidate from the School of Natural and Rural Systems Management at The University of the Queensland, Australia. The presentation included a Powerpoint software presentation using a data projector. The presentation sought to summarise the findings from the research, covering the analyses of the similarities and differences between the communities involved in the survey in terms of their socio-economic characteristics and tree planting and management attitudes, behaviour and intentions. Data were also presented from the results of statistical tests for relationships between socio-economic factors and tree planting and management attitudes, behaviour and intentions. Finally, a typology of households in relation to their tree planting and management was presented and discussed.

For several reasons, the presentation was limited in success in terms of improving participants' understanding of the findings of the survey. The first of these is that a speaker, who is native to Australia, presented the material in English. Although English is the official language of the government and used in teaching secondary classes and at colleges, many of the participants are not familiar with Australian accents and had difficulty understanding what was being said. A second and perhaps more important problem was that the presentation was too detailed and statistical in nature. The speaker was not experienced in presenting materials to non-scientific audiences. The presentation contained numerous data tables and references to statistical measures outside the experience of the audience and as a consequence the main messages were sometimes lost. In fact, many in the audience lost patience during the presentation, questioning the format used, as well as the validity and meaning of the findings.

Fortunately, Dr Mangaoang was able to address the above concerns through his ability to summarise and interpret the findings of the study for the audience. Discussions during and following the presentation revealed that most of the participants had been able to understand the study findings with Dr Mangaoang's assistance. He and other faculty members of the College of Forestry have an intimate understanding of the study due to their participation in the development of the methodology, and also due to the presentations of the findings which had been made earlier to College of Forestry staff, and Dr Mangaoang's formal and informal discussions with the study leader.

The reactions of the audience to the presentation emphasised that using a 'scientific' format is not appropriate in these circumstances. With the benefit of hindsight, the presenter has realised that details about methods used and details about the data are not appropriate for such audiences, unless they specifically ask for them during question time. Such details and the use of statistics serve as distractions to the main messages that the presentation seeks to deliver.

In terms of stimulating discussion, the presentation was more successful. Through highlighting the differences in socio-economic circumstances between those actively managing trees on their lands and those who are not, participants in the workshop began discussions about the nature of land ownership and tenurial arrangements, about livelihood programs that can support farmers who are waiting for trees to reach harvest age, and about community development priorities and the role and priority of tree planting programs in relation to other potential community development activities in barangays.

1.1 Findings from the household survey

In the presentation of the findings of the survey, the socio-economic characteristics of households in each of the communities were first described and compared. The survey identified that the households from Poting Bato are, on average, more disadvantaged than those in the other communities in terms of cash incomes, access to land, land ownership and ability to produce their own food. In terms of the relationships between tree planting and management activities and socio-economic factors, the findings from the survey emphasised the importance of land tenure security to enable households to participate in tree planting and management activities. A higher rate of ownership of land by households and higher levels of cash income were found to be associated with greater participation in tree planting and management activities. The survey found that the majority of households are presently managing at least a few trees, mostly to provide for their own timber requirements. Few households (approximately 10%) plan to sell timber from the trees they are presently managing. Approximately 25% of households indicated that they wish to plant trees to sell timber in the future, and 75% expressed interest in commercial tree farming. One requirement for those planning to use trees for their own purposes or for sale is that they are registered with the DENR. The survey found that only 2% of respondents had registered their trees with the DENR, and only 15% knew how to do so.

The final section of the presentation concentrated on households' attitudes to tree planting and management and the testing of differences in attitudes to tree planting and management within barangays. Analysis of the patterns of responses led to the formation of groups with similar attitudes to tree planting and management. Subsequent analyses of the socio-economic characteristics of these groups suggested some reasons for the differences in their attitudes, as well as differences in their potential reaction to various forestry development activities.

In discussing the question of land ownership and the relation to tree planting and management, one suggested resolution for the workshop was that the DENR open up denuded public lands for tree farming, thereby making more land available to households with little or no access to land at present.

2. GROUP PRESENTATIONS

The participants were split into three groups on the basis of their organisational affiliation (Line agencies, community representatives, LGU representatives) to discuss the topics of land tenure policies, tree registration and the development of livelihood opportunities for rural communities. The groups were asked to develop short presentations to give to all the participants describing their current state of knowledge about the topics and recommendations for ways to improve policies in relation to the topics. In the following section the presentations of each of the groups is described.

2.1 Line Agencies Presentation

The presentation of the line agencies group (consisting of the DENR representatives and one representative from the DAR) contrasted markedly with those of the other groups due to their knowledge about the tenure rules and tree registration policies. They also had clear ideas about how to develop alternative livelihood policies.

2.1.1 Land Tenure Policies According to the National Constitution

The group developed a diagram (Figure 1) to illustrate the diversity of land classifications and tenurial instruments applied in the Philippines in both public and private lands. The presenter first made the point that all lands in the Philippines are, according to the National Constitution, public lands. They then explained the general land classification breakdown within public lands, with the four main categories being ancestral lands, public forestlands, lands for special uses and alienable and disposable (A & D) lands.

Most of the presentations concentrated on the A & D lands and Public Forestlands and these are the areas that will be discussed here. In regards to A & D lands, it was explained that these are the main areas that can be covered by official Certificate of Land Ownership, the tenurial instrument that grants the right to use the land and dispose of it through sale. This is issued by DAR, in conjunction with the Department of Justice and the Land Registration Commission within DAR office. A & D land can also be used for public projects such as fishpond development, which are then administered by the Bureau of Fisheries and Aquatic Resources, or mining operations, that are administered by the Bureau of Lands.

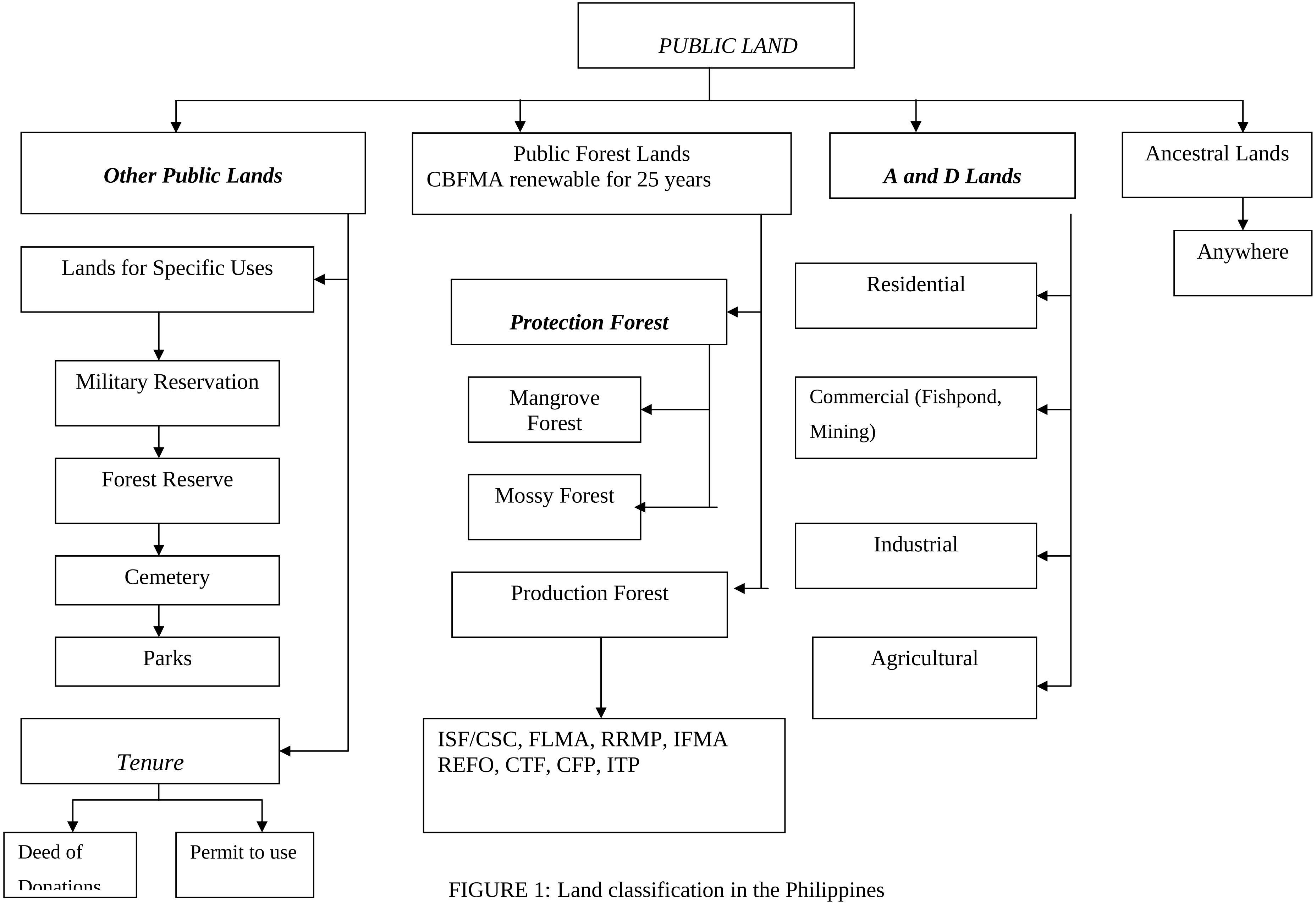

FIGURE 1: Land classification in the Philippines

The DENR administers other public forestlands and classifies them as either ‘Protection Forest’, ‘Production Forest’, and in some cases under ‘Timber Licence Agreements’ (TLAs). Forest areas classified as ‘Protection Forest’ are those in highland areas, otherwise known as mossy forest lands. Use of materials from these areas by humans is prohibited. The use of materials from Production Forest areas is allowable if the required permits and agreements are obtained. Tenurial instruments that cover these areas include those under the Community Based Forestry Management Program (CBFMP). The agreements generally cover a 25-year period and can be renewed for a further 25 years. The CBFMP is an ‘umbrella’ program that has taken in agreements that were signed under the Integrated Social Forestry Program (ISFP) (otherwise known as Certificate of Stewardship Contracts (CSCs)), Contract Reforestation Program (REFO). Another type of land classification is the proclamation of prescribed watershed areas, designed to protect stream catchments for the use of water for various purposes such as irrigation or domestic water supplies. The following types of agreements were not discussed in the presentation: Forest Land Management Agreements (FLMAs), Industrial Forest Management Agreements (IFMAs), Communal Tree Farming (CTF), Community Forestry Program (CFP), and Industrial Tree Plantation (ITP). TLAs are agreements between the national government and corporations that allow for the harvesting of timber in the designated areas, with contracts specifying the allowable volume of timber to be cut per year and specifying management activities, and payments due to the government for the harvesting rights. No TLA’s are still operative in Leyte province.

2.1.2 Tree Registration Requirements and Regulations and their Implications for Forestry Development

The presenter for the line agencies covered some of the requirements that must be met for tree plantation registration certificates to be issued. One basic requirement is that the land on which the trees are situated is classified as Alienable & Disposable by the DENR. The presenter stressed that if the land concerned is within public forestland, the trees could not be registered and would be forfeited to the government, even if they had been planted and managed by the farmer. ‘Plantations’ were defined by the presenter to be areas with more than one tree. The requirements for the registration of tree plantations on A & D land include:

- A certified copy of the certificate of land ownership or tax declaration certificate;
- A sketch map of the plantation area;
- Photos of the area to show the size of the plantation;
- Visual inspection of the area by a DENR representative;
- A letter from the barangay captain stating the land concerned is indeed owned or managed by the party applying for the registration certificate; and
- A letter from the mayor of the Local Government Unit verifying the authenticity of the letter by the barangay captain.

The presenter explained that the letter from the barangay captain and the mayor’s office were needed to avoid the potential for disputes between parties over land ownership and ownership of the trees therein.

The presenter also described two additional permits that apply to the management of tree plantations, viz. cutting and transport permits. It was observed that once a tree plantation is registered a cutting permit is not required, so long as it can be proven that the trees to be harvested are mature. The rationale for this requirement is to "avoid wasteful tree product utilisation". If the trees are to be transported once they have been cut, then a transport document or permit is required. In order to obtain a transportation permit from the DENR (otherwise known as ~~a~~ Self-Monitoring Form), a certified copy of the Certificate of Tree Registration is needed. If a big volume is to be transported by a person other than the registered owner of the plantation, then the name of the person undertaking the transport has to be included on the form, and a Transport Authority permit from the plantation owner must be obtained and carried by the person transporting the timber if they themselves are not the owner of the plantation. In regards to the marketing of tree products, it was stated that there are no restrictions on who can buy the timber or the price that is offered or received.

In summary, the presenter asked: "what should be done to make this effective?" He recognised that there had been requests for the DENR to disseminate information about tree registration and tenurial instruments, while other farmers, he said, claim they are too busy with their livelihood activities to have time for listening to DENR extension officers seeking to explain the regulations to farmers and LGUs. His conclusion was that the dissemination of information is the responsibility of the Information, Education and Communication (IEC) section of the DENR, and argued that "… the effectiveness (of policies) depends on the comprehension of the stakeholders".

2.1.3 Alternative Livelihood Strategies for Smallholders Involved in Forestry Activities

The presenter recognised that one of the unavoidable and unfavourable characteristics of tree plantations is that they take a long time to reach harvest age. The solution he discussed was the use of agroforestry systems, the planting of food crops among the trees whilst they are still young so as to provide cash flow to the household whilst waiting for the trees to reach a harvestable size. Other activities discussed included cut-flower production, raising of animals and using the cut-and-carry method, growing and using minor forest products (like rattan for furniture manufacture) to maximise the value of the land.

The presenter finally considered the concept of sustainability. He observed that the government has a number of programs which are designed to improve the sustainability of agriculture and other land use options of rural households, but what is lacking is consistency in the programs, and communication of both the regulations relating to forestry and ideas and methods that have been proven successful in various communities. He recognised the inconsistencies in policies between the national and local government agencies and suggested that they be made consistent, and should be stable. The problem of useful programs being discontinued upon changes in political administrations following elections was recognised. It was recommended that programs should be evaluated on their merit rather than by who had initiated them. Another point recognised by the presenter was the importance of local adaptation of recommended practices to suit local conditions. Finally, the presenter recognised the value of networking between communities and government agencies, and cross project visits to facilitate communication of successful ideas.

Questions were addressed to the presenter on the topics of the role of the LGUs, the status of the IEC program in the DENR, and the continuing role of the DENR in community forestry programs, particularly in terms of the program in Poting Bato. Most attention was paid to the lack of understanding of the tenurial regulations and tree registration policies in the communities and LGUs. Several speakers inquired about the status of the DENR IEC program and requested that a "concrete" program be established rather than have a general policy statement that requires DENR personnel to engage in communicating policies and program information.

In regard to the continuing presence of the DENR in communities involved in community forestry programs, the audience asked that DENR maintain a higher level of interaction with the communities. This was linked to the need for greater efforts to be made in terms of developing a formal IEC program. DENR representatives pointed to the need to involve other agencies including the Department of Agriculture, particularly in terms of developing alternative livelihood strategies.

2.2 Local Government Units Presentation

The presentation of the LGU representatives followed that of the line agencies. The following sections summarises the presentation that was made and the discussions that occurred.

2.2.1 Local Government Units Understanding of and Roles in Relation to Tenure Policies

The main point made by the representatives of the LGUs was that they felt they were not properly or officially informed about the tenure policies of the national government. The point was made that if any of them did have some knowledge about tenure policies, it was through their own investigations and personal experience rather than through information distributed by the DENR or DAR. They expressed dissatisfaction that they were not informed when DENR initiated programs including community forestry agreements and other community development programs in the areas under their jurisdiction. The LGU representatives maintained that if they were informed about DENR programs in their areas, it was only when the DENR were experiencing problems while the project was operating. The LGU representatives called for greater information to be provided about tenure and tree registration policies, and for LGUs to be involved in all phases of projects, from conception through implementation, monitoring and evaluation. In regards to land management regulations, the presenter noted the discrepancy between the rules restricting tree planting and management, in contrast with the lack of restrictions in relation to agricultural crops, with the result that tree planting and management is less attractive to farmers.

2.2.2 Local Government Units Understanding of and Roles in Relation to Tree Registration Policies

In regards to tree registration policies, the presenter noted that the presentation from the line agencies had cleared up some of the queries about these policies, but there were still a number of issues that remained unclear, such as whether individual trees had to be registered.

One means to improve the tree registration process that was proposed by the LGU representatives was for the process to be decentralised. They pointed out that the present requirements to travel to DENR offices meant that the farmers must incur large expense for transport and food whilst travelling, with no guarantee that the officers they sought would be available when they reached the office. The presenter argued that if the DENR was able to provide training to the LGUs about the tree registration requirements, then LGUs could then take responsibility for registering plantations, thereby reducing the expenses involved and increasing the involvement of the LGUs in land management issues.

2.2.3 Local Government Units Understanding of and Roles in Relation to Alternative Livelihood Programs

Again, the presenter argued that the development of alternative livelihood programs had taken place in their areas of jurisdiction without sufficient involvement of the LGUs. The need to conduct feasibility studies of these programs from the farmers' point of view was discussed, with the suggestion that LGUs could be in a position to aid community members to undertake such studies.

In conclusion, the presenter argued that for the policies to become workable the most important factors are coordination between government agencies including the DENR and LGUs, and there must be a "full-blast" IEC campaign. The primary requirement for these communication problems to be solved, it was argued, is that an adequate budget be specified and allocated to an IEC program.

Questions were raised by the audience regarding how 'checks and balances' could be maintained if greater powers were given to LGUs in relation to land tenure and tree registration issues. One response was that CENRO officials could also potentially abuse their positions. Another response was that the devolution of responsibilities for environmental management to LGUs, which has already occurred in relation to responsibility for protection of endangered species, is lacking effectiveness due to the lack of financial support for the programs and lack of a clear framework in which to operate. Requests were made for a DENR liaison officer to be appointed for each LGU or for municipal-based DENR offices to be established to reduce costs involved in tree registration, provide training about environmental management issues, and provide training about the policies applying to environmental management.

2.3 *Community Representatives Presentation*

While the community representatives made a number of observations about the topics under consideration, their presentation was dominated by questions about the implications of tenure and tree registration policies on the tree planting and management activities within their barangays. The points raised by the community representatives are listed in detail in Tables 1 to 3. As was the case of the presentation of the LGU representatives, the community members stressed the importance of developing an effective IEC program in regards to land ownership and tree management issues, and the difficulties created by the lack of policy stability.

In regards to tenure policies, the community representatives raised the issue of the ability of tenants to grow the crops they prefer on the lands they lease. They stated that they are apprehensive that if they choose to plant trees on leased land, they may be liable to prosecution by the landowner (Table 1).

In terms of tree registration and cutting permits, the community representatives suggested that the DENR should not issue cutting permits unless the barangay captain issues a letter that authorises the permit (Table 2). This is apparently already a condition for the issuing of cutting permits, but it may be that they knew of cases where this did not occur. They appear to also support moving the responsibility for tree registration to the LGUs as suggested by the LGU representatives. Other suggestions included requests that DENR personnel visit communities to register tree plantations, and those community members who have not planted any trees should be denied cutting permits, even for the sake of house construction. The lack of knowledge about tree harvesting and markets were mentioned as factors constraining the participation of households in commercial tree farming activities.

Finally, in relation to alternative livelihood programs, the community representatives suggested that the responsibility for these programs be also given to the LGUs in the hope that they would be able to monitor the progress of the programs more effectively, and therefore respond more quickly to any deficiencies in the programs (Table 3). The community representatives saw livestock raising and vegetable farming as possible means to provide income in the period taken for trees to mature, and requested that greater assistance be provided by government agencies generally to assist them in the development of these enterprises.

Table 1. Community representatives’ perceptions about tenure policies and recommendations to improve them

Knowledge/Perception	How to make policy/arrangement effective?
• Most people don’t have knowledge about tenure policies.	• Conduct training and seminar about policies so that we will know
• There exists a problem between the tenant and the landowner. Tenant is willing to plant trees but the owner doesn’t want. Can the tenant be filed with a case if he decides just by himself to plant even fruit trees?	
• Policies may not forever be followed, it may be changed	• Policies will become effective if these will be followed, especially if done by a group or association
• Weak policy on CBFMA. Lack of information	• Provide massive information campaign about CBFMA policy
• There are tenurial policies but lacking information dissemination in communities	• LGU or Agrarian Officer should give exact tenure policy.
• CSC- 25 year’s contract. Used as collateral in world bank, 70% grant, 20% loan, 10% mobilization	• Strict implementation of policies
• Tree registration policy; certification from barangay and municipal mayor for permit to cut	
	• It’s perhaps wise if those who don’t have planted trees within the barangay will never be permitted to cut trees for house construction
	• Not allowed to secure permit to cut from the DENR if there is no certification from the barangay

Table 2. Community representatives' perceptions about tree registration policies and recommendations to improve them

Knowledge/Perception	How to make policy/arrangement effective?
• Is it allowed to cut trees you planted in your own land even without permit?	The DENR should conduct information drive to the barangay residents so that the people will become aware about existing policies
• Can it be possible to register trees even if they are already matured?	
• Harvesting scheme adopted by PRA (Poting Bato Reforestation Association) Not a member – 15% Member – 20% Owner of the land who is at the same time a member – 45% ADB share – 20%	Barangay officials should be the first ones to plant trees and register them to the DENR, so that it will be easy to transmit the knowledge about the policies and also youth will become aware about it.
• To whom will we approach in case when we register trees where in fact CENRO is far, and how much is the charge?	
• If trees will be used for household construction, is it still necessary to ask permission from the DENR? How much is the charge in cutting? What are the requirements?	DENR should allocate time for tree registration in the municipalities so that the people may know and maybe more people will register their trees.
• If a tree is growing in our land but we did not plant it, can we register it? This land is neither titled nor a timberland but it has tax declaration.	
• Register the tree you planted to the DENR. When harvesting, ask a permit. The DENR will send an inspection team to survey your trees.	
• If there are trees from the barangay and when it reaches to the municipal level it will be released, what is the solution for this?	
• People will not plant trees because income generation takes longer time, what can we do to encourage to them?	
• Where and how do we implement where in fact we don't have knowledge about harvesting and marketing systems of tree products	
• If my trees are already registered and they were cut by somebody for sale can I file a case against him?	
• Tree registration can help our forest and nature	
• The SK in our barangay has a program called "Green Brigades". They planned to plant trees but they don't have land that could be planted. Is it possible to plant in the timberland? Where should we ask permission?	
• We have harvestable trees but are not registered in the DENR can we secure a cutting permit for it especially if used for household construction?	

Table 3. Community representatives' perceptions about alternative livelihood programs and recommendations to improve them

Knowledge and perception	How to make effective
	• A good farming system where trees are still young is to introduce pineapple or abaca so that there is income that could be generated while trees are still growing.
• About livelihood in our barangay in Matalom, the association proposed sow for breeding that could be raised by the member. When the sow produces offspring the LGU will be given one that could then be introduced to another member for domestication. However, this was not effective because the domesticator doesn't have financial input for feeds.	• Why is there a need for the LGU to establish livelihood projects for the people who cannot buy feeds for their domesticated pigs? • If there is any livelihood project initiated, the LGU should always monitor their people so that whatever problems may arise can be given immediate attention.
• While the tree cannot be used yet because of its longer gestation characteristic, it is wise to involve in alternative livelihood such as piggery, poultry, or even in small stores. Other farmers don't just depend on trees but also to other livelihood activities like vegetable farming and others.	• Raising pigs with provision of free feeds so that the people will be encouraged to plant trees.
• Establish a cooperative so that there is a stable policy. Formulation of policies can be made possible through the support of different government agencies that have the authority.	• What are the best ways and means that can be shared to the people who planted trees because trees take longer time to benefit the farmers?
	• While we are waiting for our planted trees, we want to ask what agency we should approach that could help us find livelihood sources that could sustain our needs for the meantime.